IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF NORTH CAROLINA
NORTHERN DIVISION
No. 2:23-CV-00058-BO-BM

CENTER FOR BIOLOGICAL DIVERSITY,

Plaintiff,

v.

DEB HAALAND, et al.,

Defendants.

THE CENTER'S APPENDIX TO STATEMENT OF UNCONTESTED FACTS

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BEFORE THE U.S. FISH AND WILDLIFE SERVICE

EMERGENCY PETITION TO REVISE THE RED WOLF'S 10(j) RULE

Photo Credit: B. Barte/U.S. Fish and Wildlife Service

ANIMAL WELFARE INSTITUTE
CENTER FOR BIOLOGICAL DIVERSITY
ENDANGERED SPECIES COALITION
SOUTH FLORIDA WILDLANDS ASSOCIATION
WILDEARTH GUARDIANS
WILDLANDS NETWORK
WOLF CONSERVATION CENTER

MAY 24, 2016

The Honorable Sally Jewell
Secretary
Department of the Interior
1849 C Street N.W.
Washington, D.C. 20240
exsec@ios.doi.gov

The Honorable Dan Ashe
Director
Department of the Interior
1849 C Street N.W.
Washington, D.C. 20240
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Dear Secretary Jewell and Director Ashe,

The Animal Welfare Institute, Center for Biological Diversity, Endangered Species Coalition, WildEarth Guardians, Wildlands Network, and the Wolf Conservation Center hereby submit this emergency petition to the U.S. Department of the Interior and the U.S. Fish and Wildlife Service (Service) to strengthen existing regulations for the red wolf to stem the rapid decline of the only wild population of red wolves in the world. In the last several years, the red wolf's wild population has fallen by approximately 50 percent. At present there may as few as 45 red wolves left in the wild, and the species could be soon extirpated if the Service refuses to take action to better protect it. As records recently obtained via a Freedom of Information Act request confirm, the Service is deliberately abandoning the red wolf program against the advice and recommendations of its own staff biologists, who have pressed the Service to better address illegal red wolf shootings. Unfortunately, their calls to action have been ignored and stymied by upper-level political management within the Service.

Our emergency petition requests that the Service meet its mandatory duty to protect and conserve the red wolf by revising the current red wolf regulations under Section 10(j) of the Endangered Species Act in order to reduce shooting deaths, establish additional wild populations of red wolves in the wild, and reclassify all reintroduced populations of red wolves as "essential" experimental populations.[1]

For all of the reasons explained below, the Service must grant our petition and take emergency actions to strengthen and revise the current red wolf 10(j) regulations. Should the Service fail to respond to this petition in a timely manner, the Petitioners may pursue relief in federal court.[2]

[1] 16 U.S.C. § 1539(j); 50 CFR § 17.84(c)

[2] The Petitioners and their members are "interested persons" within the meaning of the APA. *See* 5 U.S.C. § 553(e) (granting any "interested person the right to petition for the issuance, amendment, or repeal of a rule"); *see also* 5 U.S.C. § 702 & § 551(13) (providing that "agency action" includes "the whole or a part of an agency rule, … or the equivalent or denial thereof, or failure to act"); *id.* § 706(1) & (2)(A) (granting a reviewing court the authority to "compel agency action unlawfully withheld or unreasonably delayed" and/or to "hold unlawful and set aside agency action … found to be… arbitrary, capricious, an abuse of discretion")

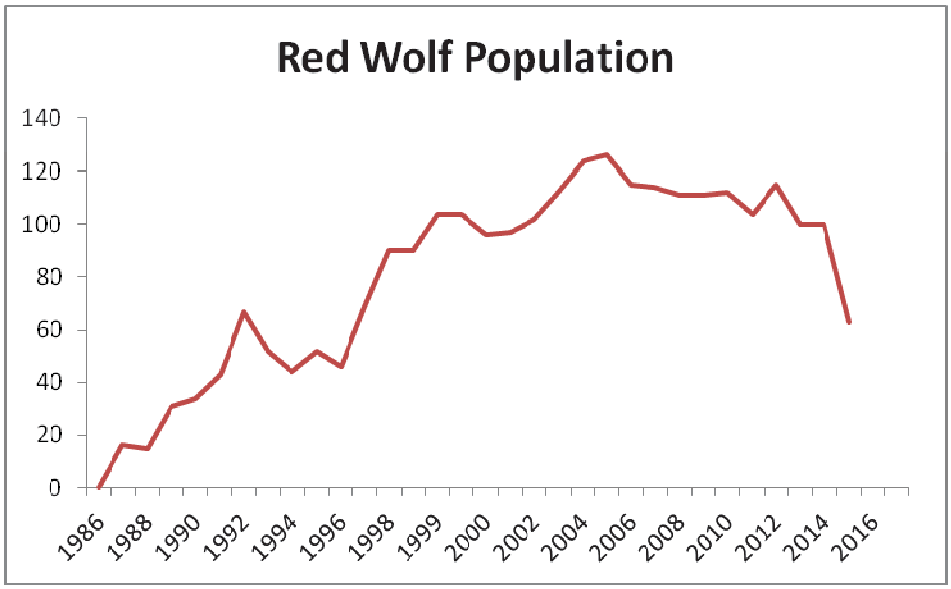
I. The Service is Illegally Dismantling the Once Successful Red Wolf Recovery Program

Genetically and morphologically distinct from gray wolves, red wolves (*Canis rufus*) are the only wolf species found completely within the United States.[3] Although once abundant across the Southeast and elsewhere, red wolves faced near-extinction by the 1960s due to decades of persecution that aimed to eliminate them from the landscape.

Under a precursor to the Endangered Species Act, the red wolf gained protection as an endangered species in 1967.[4] In 1975, after a remnant population of red wolves was located along the Gulf coast of Texas and Louisiana, the Service captured 17 wild red wolves for a captive breeding program, and thereafter declared red wolves to be extinct in the wild.[5] In 1986, the Service established a "nonessential experimental population" of red wolves at the Alligator River National Wildlife Refuge in northeastern North Carolina, returning the species to the wild after a ten-year absence.[6] Since then, the experimental population area had expanded to include three national wildlife refuges, a Department of Defense bombing range, state-owned lands, and private property, spanning a total of 1.7 million acres.

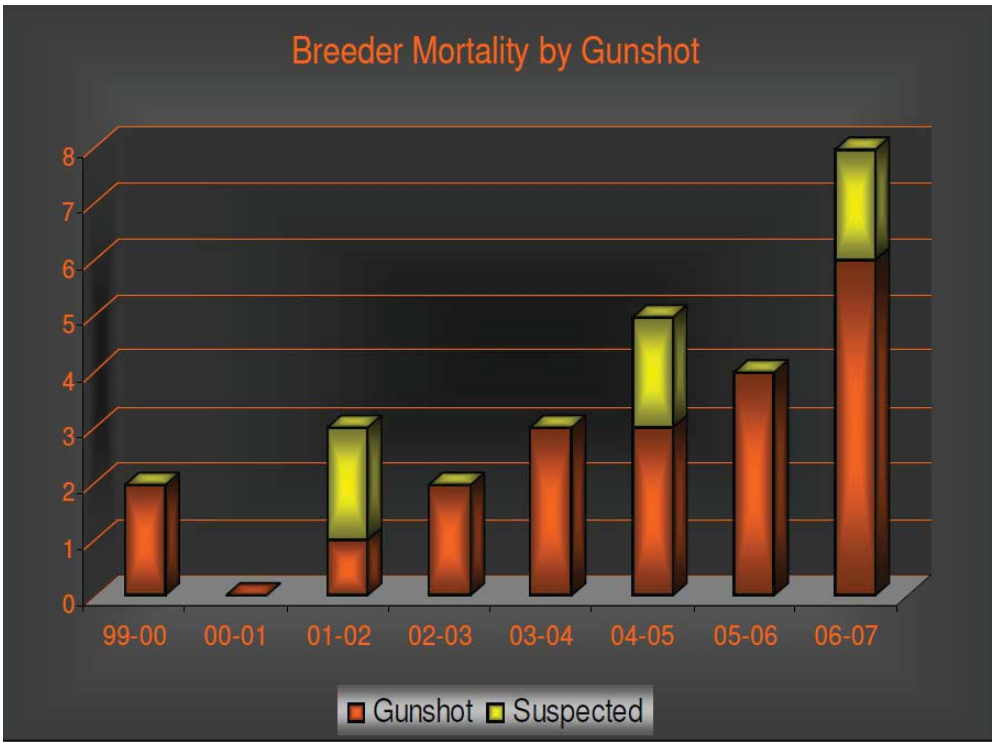
Reintroduction of these wolves into the wild was a monumental step forward for the red wolf, but the specific language of the 10(j) rule that governs management of this reintroduced population has had negative long-term consequences for the recovery of the red wolf.[7] The existing 10(j) rule is the result of amendments in 1995 to the 10(j) rule that added provisions for taking red wolves on private property.[8] The current 10(j) rule authorizes killing of wild wolves under numerous circumstances, thereby perpetuating the threats that caused the red wolf to decline to near-extinction. The permissive language of that rule has permitted excessive levels of human-caused mortality, preventing the population from growing beyond approximately 100-120 wolves in the wild.[9] The rule's structure has helped facilitate the Service's recent abandonment of the program and cause the population to fall by half.

[3] Nowak 2002, Brzeski et al. 2016
[4] 32 Fed. Reg. 4001 (March 11, 1967)
[5] Gilbreath and Henry 1998
[6] 51 Fed. Reg. 26564, 26569 (July 24, 1986)
[7] Phillips 1990
[8] 56 Fed. Reg. 56325 (April 13, 1995)
[9] Hinton et al. 2013, Hinton et al. 2015a, Hinton et al. 2015b



In 2007, the Service completed a five-year status review for red wolves, which recommended that the Service work to establish a second and third red wolf population in the wild.[10] The status review also recommended the implementation of measures to reduce the rate of anthropogenic mortality, including efforts to work with states and local municipalities to enact regulations aimed at reducing gunshot mortality and vehicle strikes. The 2007 status review identified "making improvements in the current experimental rule" as a means of addressing some of the threats and problems with the reintroduction effort.[11] Likewise, since the 2007 review, scientists both within and outside the Service have recommended revising the 10(j) rule.[12]

[10] USFWS 2007, p. 35
[11] *Id*. at 28.
[12] Parker and Phillips 1991, Gilbreath and Henry 1998, USFWS 1999



Source: U.S. Fish and Wildlife Service. 2007.Red wolf (*Canis rufa*) 5-Year Status Review: Summary and Evaluation at page 29.

In May of 2011, the red wolf recovery director, David Rabon, wrote a memorandum to the Service's Southeast Regional Director explaining why revisions to the 10(j) rule were needed. He explained:

> Increasing levels of anthropogenic-caused mortality (e.g., gunshot, illegal trapping, poisoning) in red wolves, public misconceptions about red wolves, and changes in the strategies to manage red wolves and other wild canids warrant a revision and clarification of the NEP [nonessential experimental population] rule. The current NEP rule is no longer effective to address the current and future management needs of the red wolf, and is precluding the development of sound management strategies for this and other species of management interest (e.g., coyotes, foxes).[13]

He further explained:

> Since 2004, the [Red Wolf Recovery Program] has witnessed a steady increase in the number of wolves killed by gunshot or other similar illegal activity. We have recorded 83 wolves taken as the result of anthropogenic-caused activities since the wolves were reintroduced in 1987. Beginning in 2004, the number of wolves killed as a result of these types of actions increased to nearly seven (7) wolves per year, compared to about two (2) wolves lost per year between 1987

[13] USFWS 2011b; *see also* USFWS 2013 at 21 (providing nearly identical information in the draft, unpublished revised 10(j) rule)

> and 2003. Furthermore, approximately 60% of the wolves killed have been breeders. This level of take appears to be having a negative effect on population growth because it results in the loss of a breeding pair and potentially their reproductive effort. In addition, responding to the loss of wolves requires an unnecessary reallocation of time and resources to counter its effects (e.g., increased hybridization, increase in the number of coyotes filling space created by the loss of a wolf, reduced recruitment of red wolves). We believe this rise in anthropogenic caused mortality is the result of (1) a misunderstanding of the legality of actions that result in take, (2) a misconception of activities that are exempt from take under the NEP designation; (3) general misconceptions about red wolves and the presence of coyotes; and, (4) an increased interest by the public and the State of North Carolina (i.e., NCWRC) to "manage" nuisance coyotes. We would revise the NEP rule to clarify the legality of actions that constitute take and the exemptions for take of red wolves as it relates to our management strategies (described above) and to reduce the potential for illegal anthropogenic-caused mortality (e.g., gunshot, illegal trapping, poisoning).[14]

In the fall of 2011, the Service included potential updates to the 10(j) rule as part of its unified regulatory agenda that is presented to the White House Office of Management and Budget.[15] The Service explained that the intent of the rule was: "(1) To simplify reintroduced population information; (2) to explain changes in the protocols to manage red wolves and other canids; and (3) to clarify the legality of actions and the exemptions for take of red wolves."[16] The Service intended to publish a proposed rule by December of 2013 and a final rule by November of 2014.

Despite its clear intention to revise the rule, the Service has not yet done so. However, records from a Freedom of Information Act request show that the Service had completed a draft revision of the rule by 2013. The draft rule confirms several important facts about the red wolf's recovery:

- "[T]here is likely enough space available for wild red wolves to establish additional territories and that population expansion could continue in subsequent years" in the North Carolina reintroduction area.[17]
- From 1987 through 2013, the leading causes of wild red wolf mortality in North Carolina were: "gunshot (23.6%), vehicle strikes (19.2%), management (4.6%), health-related/disease (15.7%), intraspecific aggression (6.5%), accidental loss during private trapping activity (3.8%), poison (3.0%), other suspected illegal take (3.8%), and unknown causes (19.8%)."[18]
- "The red wolf poses virtually no threat to livestock in situations where its natural prey is abundant. As of June 2013, the reintroduced population of red wolves in northeastern

[14] *Id*.; *see also* USFWS 2013 at 23-24 (providing nearly identical information in the unpublished revised 10(j) rule)
[15] USFWS 2011a
[16] *Id*.
[17] USFWS 2013 at 8
[18] *Id*. at 10

North Carolina has been responsible for only 5 confirmed livestock depredations since 1987 (USFWS unpubl.)."[19]

- "In recent years, red wolf mortalities resulting from gunshot have increased substantially."[20]

Most notably, the unpublished draft rule would have removed the provision found at 50 C.F.R. § 17.84(c)(4)(ii) which allows for incidental take that is "incidental to lawful activities" and would have greatly curtailed take of red wolves when such animals are considered potential nuisance animals.[21]

In July 2014, Ryan Nordsven, a red wolf biologist with the Service, sent an email to the Southeast Regional Director and Assistant Regional Director highlighting the urgent need to revise the 1995 10(j) rule — which included a promise from the Service to revisit the take exemptions in the rule to determine if excessive illegal take of red wolves was occurring — and address the threats to the red wolf:

> It has been our experience during the better part of the last decade that excessive taking of red wolves is indeed occurring because of the revised special rule. We believe it has led to not only less wolves on the landscape and less pup recruitment via a high percentage of breeder mortality, but also increased hybridization with coyotes through disruption of pack stability, all of which has greatly hindered our ability to recover red wolves. At any rate, since issuing the statement of intention to "revisit this issue," almost 20 years have now passed with no reassessment of the rule revision taking place (despite requests from Red Wolf Recovery Program staff to do so).[22]

In addition to Service staff and biologists confirming the need to revise the red wolf regulations, outside scientists have also confirmed the need to bring additional resources to bear to recover the red wolf. A November 2014 Wildlife Management Institute report concluded that although the red wolf reintroduction program has been initially successful, **further recovery depends on establishment of at least two additional populations** and the Service needs to spend more resources to build local stakeholder support for the program.[23]

Unfortunately, and despite the recommendations from staff on the ground to provide more assistance to the red wolf, the leadership of the Service has severely and deliberately mismanaged the Red Wolf Recovery Program, causing significant declines in the red wolf population. The Service eliminated the red wolf recovery coordinator position in August of 2014 without any legitimate rationale to support this decision. It also ended its coyote sterilization

[19] *Id*. at 20
[20] *Id*.
[21] *Id*. at 37-46
[22] USFWS 2014b
[23] WMI 2014

efforts in early 2015, despite evidence that use of such "placeholder" coyotes reduced production of hybrid litters and thereby limited genetic introgression.[24]

Moreover, citing no legal authority to do so, the Service announced in June of 2015 that it was halting all red wolf releases to do a "feasibility study" of the Red Wolf Recovery Program.[25] Making matters even worse, the Service stopped its public education program. The Service has also curtailed investigations and prosecutions of suspected illegal red wolf mortalities. In fact, the Service did not issued any timely law enforcement press releases seeking information on illegally killed red wolves between 2014 and April of 2016, even though numerous wolves were killed by suspected or confirmed gunshot and/or illegal take during this time period.

Put simply, the Service appears to have washed its hands of the Red Wolf Recovery Program, likely condemning the species to extinction in the wild within the next few years. Since 2013, the Service's own data shows that the red wolf's wild population has fallen by nearly 50 percent, as indicated in the table below.[26] To save the red wolf, a stronger 10(j) rule is required to launch additional reintroductions and curtail the discretion of the Service and its Director to prevent any mismanagement of the Red Wolf Recovery Program and to limit further harm to the red wolf by the Service.

II. The Red Wolf Must Be Reintroduced To Additional Areas

The ESA provides that the Service may introduce experimental populations of threatened and endangered species back into the wild in their historic range where they are extirpated.[27] Pursuant to that authority, the 1990 Red Wolf Recovery Plan called for the reintroduction of wolves into at least three areas within the wolf's historic range (USFWS 1990). Specifically, the Plan's objectives include:

- Establish and maintain at least three red wolf populations via restoration projects within the historic range of the red wolf. Each population should be numerically large enough to have the potential for the natural evolutionary processes to work within the species; and
- Remove threats of extinction by achieving a wild population of approximately 220 wolves and a population of approximately 330 wolves.[28]

The recent Wildlife Management Institute report (2014) reaffirmed the need for additional reintroduction. The report found that: "Successful accomplishment of the current recovery plan objectives will require identification of suitable areas and reintroduction of red wolves to 2 other distinct locations within historic red wolf range."[29]

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[24] Hinton and Chamberlain 2014, Gese and Terletzky 2015, Murray et al. 2015.
[25] The Service planned to finish its feasibility study at the end of 2015 but has now pushed back its completion date until summer of 2016 (USFWS 2015).
[26] USFWS 2016
[27] 16 U.S.C. § 1539(j)
[28] USFWS 1990, p. 10
[29] WMI Report at 3

There are many reasons why reintroduction into additional sites is necessary for red wolf survival and recovery. First, a greater number of reintroduction sites allows for the eventual establishment of a healthy metapopulation, featuring interactions between populations to achieve the necessary exchange of genetic material critical to species restoration and eventual delisting. Increased genetic diversity from additional reintroductions will further act to mitigate inbreeding depression associated with small isolated populations.[30]

Expansion of the reintroduction program is also of critical importance to the management of disease.[31] With only one wild red wolf population, disease has the potential to spread and wipe out that population. The establishment of at least two more reintroduction sites within red wolf historic range could partly alleviate disease risk.[32] Furthermore, expanding recovery efforts across the red wolf's historic range will facilitate evolutionary processes, such as natural selection, that are needed to promote adaptation and population persistence in anthropogenic landscapes.[33]

Scientists have developed criteria for assessing potential reintroduction sites.[34] Considerations include: 1) reproductive isolation from coyotes; 2) adequate prey base (i.e. white-tailed deer); 3) minimum space requirements; 4) human and road densities; and 5) tolerant landowners and supportive institutions. Experience has shown that red wolves will use human-associated landscapes and can thrive if protected from shooting and trapping. They prefer lowland forests and wetlands as naturally occurring habitats and agricultural fields and pine plantations as human-altered habitats.[35] Red wolves prefer areas with secondary roads for their hunting and visibility needs as long as human density remains low.[36]

The fear of red wolf hybridization with coyotes has been one of greatest concerns associated with reintroduction efforts. Yet in larger populations, red wolves will likely have less incidence of hybridization with other species of canids, as red wolves will have a larger pool of available mates.[37]

Scientists have identified numerous potential areas for red wolf reintroduction. Possibilities include:

- Central Coastal North Carolina, including Croatan National Forest[38]
- Daniel Boone National Forest in eastern Kentucky[39]

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[30] Brzeski et al. 2014; USFWS 2007, p. 10
[31] Brzeski et al. 2015
[32] Bartel and Rabon 2013
[33] Bartel and Rabon 2013
[34] Kelly et al. 1999, p. 49-52; Shaffer 2007; van Manen et al. 2000
[35] Dellinger et al. 2013; Hinton 2010; Hinton 2015c
[36] Dellinger et al. 2013
[37] Sparkman et al. 2012, Hinton et al. 2015a, Bohling and Waits 2015
[38] Shaffer 2007
[39] Jacobs 2009

- Central Panhandle in Florida, including Apalachicola National Forest and St. Marks National Wildlife Refuge[40]
- Okeefenokee ecosystem in Georgia, including Okefenokee National Wildlife Refuge and Banks Lake National Wildlife Refuge[41]
- Northwestern Alabama[42]
- Everglades National Park and Big Cypress National Preserve[43]

This petition does not analyze the various potential reintroduction areas, but Petitioners ask that the Service use its expertise to establish at least two additional reintroduction sites, consistent with the 1990 Recovery Plan, 2007 status review, and the guidance provided by the Wildlife Management Institute 2014 report.

III. The Only Remaining Red Wolves in the Wild Must Be Considered "Essential" Experimental Populations

Under the ESA, the Service must determine if an experimental population of reintroduced red wolves is "essential to the continued existence of an endangered species."[44] The consequences of designation as essential or nonessential are significant.[45] If the experimental population is deemed "essential," the species is treated as "threatened" and can receive the full protection afforded by the ESA, including designation of critical habitat, and all agencies must consult with the Service under Section 7 of the ESA if an action may affect the experimental population.[46] In contrast, critical habitat cannot be designated for nonessential populations, and members are afforded full Section 7 protections only within the National Wildlife Refuge system and the National Park system.

Although the ESA does not define what is required for an experimental designation to be deemed "essential," the Congressional intent is fairly clear: "The Secretary shall consider whether the loss of the experimental population would be likely to appreciably reduce the likelihood of survival of that species in the wild. If the Secretary determines that it would, the population will be considered essential to the continued survival of the species."[47] In other words, the relevant question here is whether survival of the red wolf in the wild would be reduced by loss of those wild wolves.

When the red wolf was reduced to captivity in 1980 — causing its extirpation in the wild — the experimental population at Alligator River National Wildlife Refuge should have been considered "essential" to the species' existence because it was the only wild population in

[40] van Manen et al. 2000
[41] *Id*.
[42] *Id*.
[43] USFWS 1990, p. 13
[44] 16 U.S.C. § 1539(j)(2)(B)
[45] Parker and Phillips 1991
[46] 16 U.S.C. § 1539(j)(2)(C)
[47] H.R. Conference Report No. 835 (quoted in Parker and Phillips 1991)

existence. That population remains the only wild population, so it must, by definition, be considered "essential."

By deeming that wild population of red wolves as "nonessential," the Service in effect has suggested that recovery of the red wolf in the wild is optional and that survival of the species in captivity is somehow sufficient. The Service has wrongly argued that a "nonessential" designation is appropriate because red wolf survival is ensured by the strong captive breeding program.[48] But a captive breeding program is not sufficient to ensure "likelihood of survival of that species in the *wild*" and the ESA's clear goal to achieve the recovery of listed species in the wild.[49]

Moreover, in captive-bred populations, artificial selection may promote traits that make the animal more successful in captivity but less successful in the wild. Wild populations, in contrast, are subject to natural evolutionary process that increase genetic diversity and help ensure that the wolf can survive and recover. Given the importance of these genetically unique wild wolves, the only remaining wild population must be deemed essential.

The Service was wrong when it designated the only wild red wolf population as a nonessential, experimental population. Because the recovery plan calls for at least three reintroduced populations, the next two experimental reintroduced populations — called for in the Recovery Plan and in this petition — should similarly be identified as "essential." As such, this petition seeks to reclassify reintroduced populations as "essential," consistent with the conservation purpose of the ESA.

IV. The 10(j) Rule for Red Wolves Must Be Revised To Reduce Shooting Deaths

The Service has found that gunshot mortality is a "serious threat" to red wolves that is "hampering the ability of the red wolf" to recover.[50] Gunshot mortality has "reduced the number of breeding pairs and pups" and "the population consequences of such mortality is highly limiting."[51] From 2004 to 2012, the average annual number of gunshot-caused mortalities has increased approximately 375 percent when compared to 1988 to 2003.[52] Between 2012 and 2015, an estimated 30 out of 65 red wolf deaths were caused by shooting.[53]

By lowering the number of red wolves in the recovery area, gunshot mortality also potentially increases red wolf inbreeding and promotes red wolf hybridization with coyotes.[54] Bohling and Waits (2015) found that over half of the observed wolf-coyote hybridization events followed the

[48] Parker and Phillips 1991
[49] H.R. Conf. Rep. No. 835 (emphasis added); *Trout Unlimited v. Lohn*, 559 F. 3d 946, 957 (9th Cir. 2009) ("the ESA's primary goal is to preserve the ability of natural populations to survive in the wild.")
[50] USFWS 2007, p. 28
[51] *Id*. at 29.
[52] Bartel and Rabon 2013
[53] USFWS 2016
[54] Kelly and Phillips 2000, p. 249-51; Hinton et al. 2015a; Way 2014

disruption of a stable breeding pair of red wolves due to mortality of one or both breeders, and that humans caused 69 percent of these deaths, primarily through gunshot mortality prior to the red wolf breeding season. The scientists conclude that disruption of stable breeding pairs of red wolves facilitates hybridization, jeopardizing future recovery of the red wolf.

The current 10(j) rule is the product of amendments in 1995 that liberalized the legal shooting of wolves and has driven much of the gunshot mortality.[55] Indeed, that rule is one of the most liberal rule for killing endangered species ever promulgated. For this reason, the 1995 amendments have been the target of criticism by scientists — even from within the Service — who conclude that too many wolves can be killed under them.[56] This petition requests changes to the red wolf 10(j) rule because the structure of the current 10(j) rule allows people to shoot wolves in too many situations.

One of the most problematic exceptions to the prohibition on take of red wolves is that "[a]ny person may take red wolves found on private land" if "such taking is not intentional or willful."[57] Anyone can say they mistakenly killed a red wolf by claiming that they believed it was a coyote — and thereby fall within this exception.[58] This permissive allowance of lethal take gives a wink-and-a-nod to anyone that wants to kill a red wolf.[59] Indeed, the previous Coordinator for the Red Wolf Recovery Program explained that "potential mis-management of nuisance canids will most certainly compromise the recovery of the red wolf unless the [non-essential experimental population] rule is revised to address and clarify management strategies and the legal of actions or exemptions of take of red wolves."[60] Our proposed revised 10(j) rule, provided in the following section of this petition, removes this exception for unintentional take, which will lead to fewer deaths by encouraging people to make a positive identification before shooting. Even so, prosecutorial discretion will likely lead to very few prosecutions of people who claim they did not intend to kill a protected wolf.[61]

The current 10(j) rule also allows private landowners or their agents to kill wolves "in the act of killing livestock or pets."[62] While the Service has stated that providing tools for private

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[55] 60 Fed. Reg. 18940 (April 13, 1995)
[56] Phillips et al. 2003, USFWS 1999
[57] 50 C.F.R. § 17.84(c)(4)(i)
[58] Recognizing the impact of red wolf shootings based on mistaken identification, the U.S. District Court for the District of North Carolina preliminarily enjoined coyote hunting in the Red Wolf Recovery Area in May 2014 after six red wolves were shot to death in the fall of 2013. *Red Wolf Coal. v. N.C. Wildlife Res. Comm'n*, No. 2:13-CV-60-BO, 2014 U.S. Dist. LEXIS 65601 (E.D.N.C. May 13, 2014). That court order led to a settlement that prohibits night hunting of coyotes in the recovery area and other red wolf protections.
[59] Newsome et al. 2015
[60] USFWS 2011b
[61] Under the "McKittrick Policy," the U.S. Department of Justice will not prosecute individuals for violating the ESA unless it has proof that a person knew that he or she was killing an endangered species. As such, even outside of the exceptions provided in the 10(j) rule, people can shoot red wolves supposedly mistaken as coyotes without fear of prosecution.
[62] 50 C.F.R. § 17.84(c)(4)(iii)

landowners to defend domestic animals may help build landowners' tolerance for wolves on their property, allowing landowners to *kill* such offending wolves is too severe given the dire status of the wild population of red wolves.[63] Instead, our proposed revised 10(j) rule modifies this exception to allow private landowners or their agents to harass — but not injure or kill — red wolves on their property.

Another problematic aspect of the current 10(j) rule is that it exempts any take on public land that is "incidental to lawful activities, is unavoidable, unintentional, and not exhibiting a lack of reasonable due care."[64] With the population of wild red wolves reduced to as few as 45 animals, such a broad authorization for incidental take is unwarranted. Instead, our proposed revised 10(j) rule eliminates this provision, just as the Service's staff biologists sought to do in the draft 2013 rule that was never published. Prosecutorial discretion will ensure that people that accidentally kill a red wolf after exercising due care will not be prosecuted.

The current 10(j) rule also provides that private landowners may kill wolves if federal attempts to "capture such animals have been abandoned." 50 C.F.R. 17.84(c)(4)(v). This exception has led to private landowners killing even non-offending wolves that disperse onto private land, if the Service refuses to take action to capture them. Scientists predicted that such a provision would be "nearly impossible to implement effectively as the wolf population grows because of the difficulties of responding simultaneously to a large number of landowners."[65] Indeed, experience has shown that this exception has led to a high demand for wolf killings, as the Service has received hundreds of requests from private landowners for removal of wolves and for authorization to kill wolves.

A particularly troubling example of implementation of this rule occurred in 2015, when the Service issued a permit for a landowner to kill a red wolf that had not exhibited any problem behaviors. The private landowner shot and killed the wolf, a denning mother wolf who had previously mothered a total of 16 pups through four separate litters. No effort was made to locate her pups and their fate is unknown.

Our proposed revised 10(j) rule will reduce shooting deaths by removing this exception for private landowners. Harassing wolves on private property to discourage them from entering property is allowed under our proposed revised 10(j) rule, but killing of non-offending wolves cannot be tolerated when the wild wolf population teeters on the brink of extinction. Allowing such killing of endangered wildlife on private land also contradicts traditional notions of wildlife management; private landowners do not own wildlife, which belong to the public and should be managed for the public good. Moreover, harassment is likely more effective than live capture and removal of wolves from private lands because experience has shown that removed wolves will likely return to that same area upon release unless the animal is biologically driven to disperse.[66]

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[63] Chapron and Treves 2016.
[64] 50 C.F.R. 17.84(c)(4)(ii)
[65] Phillips et al. 2003
[66] USFWS 2011; USFWS 2013 at 22-23

The current 10(j) rule also provides that federal agents can kill any wolf "that constitutes a demonstrable but non-immediate threat to human safety or that is responsible for depredations to lawfully present domestic animals or other personal property . . . ."[67] Although we agree human safety must be of paramount importance, the killing of these highly endangered red wolves cannot be tolerated when non-lethal responses like harassment are available.

Finally, our proposed revised 10(j) rule removes reference to defense of human life,[68] as Section 11(a)(3) of the ESA already provides this exception to the prohibition on take.[69] Red wolves pose virtually no risk to human life and including such language just perpetuates negative public attitudes towards these shy animals.

V. Proposed Text for Revised 10(j) Rule

As explained above, we request the following emergency changes to the red wolf 10(j) rule at 50 C.F.R. § 17.84(c):

(c) Red wolf (*Canis rufus*).

(1) The red wolf populations identified in paragraph (c)(9) of this section are essential experimental populations.

(2) No person may take this species, except as provided in paragraphs (c)(3), (c)(4), and (c)(5) of this section.

(3) Any person with a valid permit issued by the Service under § 17.32 may take red wolves for educational purposes, scientific purposes, the enhancement of propagation or survival of the species, zoological exhibition, , and other conservation purposes consistent with the Act and in accordance with applicable State fish and wildlife conservation laws and regulations.

(4) Any private landowner, or any other individual having his or her permission, may harass members of the experimental population of red wolves while found on his or her property provided that all such harassment is by methods that are not lethal or physically injurious to the red wolf.

(5) Any employee or agent of the Service or State conservation agency who is designated for such purposes, when acting in the course of official duties, may take a red wolf if such action is necessary to:

(i) Aid a sick, injured, or orphaned specimen;

(ii) Dispose of a dead specimen, or salvage a dead specimen which may be useful for scientific study; or

(iii) Move an animal for genetic purposes.

(6) Any taking pursuant to paragraphs (c) (3)-(5) of this section must be reported to the U.S. Fish and Wildlife Service Office of Law Enforcement within 24 hours.

(7) No person shall possess, sell, deliver, carry, transport, ship, import, or export by any means whatsoever, any such species taken in violation of these regulations or in

[67] 50 C.F.R. § 17.84(c)(5)(iii)
[68] 50 C.F.R. § 17.84(c)(4)(i)
[69] 16 U.S.C. § 1540(a)(3)

violation of applicable State fish and wildlife laws or regulations or the Endangered Species Act.

(8) It is unlawful for any person to attempt to commit, solicit another to commit, or cause to be committed, any offense defined in paragraphs (c) (2) through (7) of this section.

(9) The Fish and Wildlife Service shall maintain at least three essential, experimental populations in the wild within the historic range of the red wolf.

(i) Red wolves shall be allowed to establish territories and home ranges within their historic range, wherever they are found.

(ii) The protections of the Endangered Species Act shall apply consistent with paragraphs (c)(2) – (c)(8) wherever red wolves are found in the wild.

(iii) Other than these small reintroduced populations, the red wolf is extirpated from the wild. Therefore, there are no other extant populations with which the experimental populations could come into contact.

(10) The reintroduced populations will be monitored closely for the duration of the project, generally using radio telemetry as appropriate. All animals released or captured will be vaccinated against diseases prevalent in canids prior to release. Any animal that is determined to be in need of special care will be recaptured, if possible, by Service, Park Service, or designated State wildlife agency personnel and will be given appropriate care. Such animals will be released back into the wild as soon as possible, unless physical problems make it necessary to return the animals to a captive-breeding facility.

(11) The status of the red wolf population shall be reviewed every five years to determine future management status and needs. This review will take into account the reproductive success of the mated pairs, movement patterns of individual animals, food habits, and overall health of the population.

CONCLUSION

For all the reasons provided above, Petitioners request that the Service grant this petition and revise the red wolf 10(j) rule. The recovery of the red wolf in the wild depends in large part on a legal regime that is designed to succeed, and the proposed revisions to the red wolf 10(j) rule would promote wolf recovery by reintroducing wolves to additional locations, reducing shooting deaths, and reclassifying wild red wolf populations as "essential." Petitioners therefore request that the Service respond to this petition expeditiously and no later than 45 days. If the Service fails to respond, Petitioners may pursue relief through litigation.

Sincerely,

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U.S. Fish & Wildlife Service

Draft Revised Recovery Plan for the Red Wolf (*Canis rufus*)

Third Revision
June 2022

Thirteen year old female red wolf 1743; Alligator River NWR, March 2022
Photo credit: Jennifer Hadley

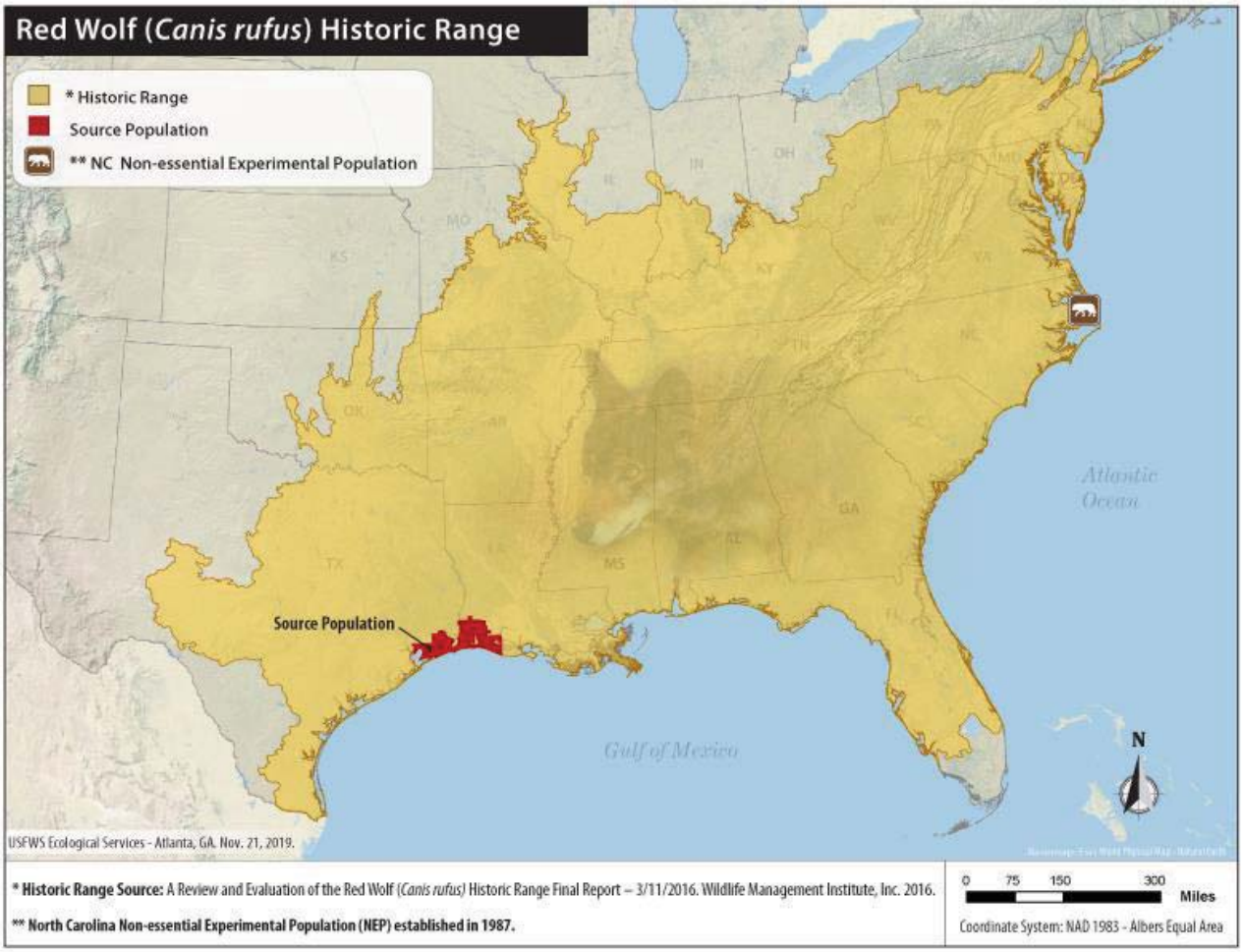

Figure 1. Historic range defined by WMI (2016, p. 23) and source population in Texas and Louisiana.

Though once common throughout its range, red wolf populations were decimated by the early 20th Century as a result of intensive predator control programs and habitat degradation and alteration (Service 1990, pp. 8-9). By 1972, the range of the red wolf was limited to a small coastal area in southeast Texas and southwest Louisiana (Riley and McBride 1972, p. 1; Figure 1).

The remnant population in Texas and Louisiana was found in fallow fields, bayous, marshes, and coastal prairie. However, the Service recognizes that this may not have been preferred red wolf habitat. Other habitats have been suggested, but given the wide historical distribution, red wolves probably utilized a large suite of habitats (Service 2018, p. 21). Any habitat in the southeastern United States of sufficient size, and which provides adequate food, water, and cover, could potentially be suitable for the red wolf. The diet of red wolves varies depending on available prey, but usually consists mainly of white-tailed deer, but can also include smaller mammals such as raccoons, rabbits, rodents, and nutria (Service 2018, p. 23).

To prevent extinction of the species, the Service established a formal recovery program in 1973 and began trapping individuals in the Texas-Louisiana area to establish a red wolf captive breeding program, with the intention of returning the species to areas within its historic range (Service 1990, pp. 9-10). The captive population started with 14 founder red wolves. In 1984, the captive program received the Association of Zoos and Aquariums' approval for a Red Wolf Species Survival Plan (SSP) program (which provides oversight for maintaining a healthy and genetically diverse captive stock). By this time, there were approximately 63 individuals in the captive population (Service 2018, p. 13).

In 1986, a nonessential experimental population (NEP) was established in eastern North Carolina for red wolves. The term "nonessential" is a legal designation of experimental populations under section 10(j) of the Act. Under section 10(j), the Service may designate a population of a listed species as experimental if it will be released into suitable natural habitat outside the species' current range. An experimental population may be considered "essential" or "nonessential." The population of red wolves in eastern North Carolina was designated as an NEP because it was fully protected in captivity. The NEP area is 6,000 square kilometers (2,317 square miles) of federal, state, and private lands in Beaufort, Dare, Hyde, Tyrrell, and Washington counties on the Albemarle Peninsula (Figure 1). In 1987, reintroduction efforts were initiated at Alligator River National Wildlife Refuge (NWR) to establish an eastern North Carolina red wolf population (ENC RWP) in the NEP area. Between 1987 and 1994, over 60 adult red wolves were released from the captive population into the ENC RWP; by the mid-1990s, red wolves in the wild were maintaining territories, forming packs, and successfully breeding (Hinton et al. 2013, p. 725).

A strategy to propagate wild red wolf offspring was initiated in 1987 with the establishment of an island propagation site on Bulls Island, Cape Romain NWR in South Carolina. Island propagation sites allow red wolves to breed in a somewhat controlled, but natural, environment to give them wild experience. Two additional propagation sites were established, one in 1989 on Horn Island, Mississippi, and another in 1990 on St. Vincent NWR, Florida (Service 1990, pp 17-18). The only remaining island propagation site, St. Vincent NWR, continues to contribute to the ENC RWP through translocation of wild red wolves.

In 1991, a second experimental population was introduced in the Great Smoky Mountains National Park (GSMNP), Tennessee. However, this effort was terminated in 1998 due to extremely low pup survival and the inability of the red wolves to establish home ranges within GSMNP. Establishing a reintroduced population of red wolves depends on the released animals producing offspring that survive to replace natural mortality and increase the population. Without surviving wild offspring, there was no expectation that the population would contribute to recovery (63 FR 54152).

Past Recovery Planning

The Service previously published three recovery plans for the red wolf. In July 1982, a Red Wolf Recovery Plan was approved by the Director of the Service. Revisions and updates to this plan were approved on September 18, 1984. The original recovery team was disbanded, and a new team was appointed by the Service's Southeast Regional Director in 1986. The latest (and most

current) plan was approved on October 26, 1990. There has been a significant passage of time since the last plan was developed; much has changed and new information on the red wolf has become available in the last three decades. We are updating the recovery plan to properly guide recovery actions considering the current status of the species and new information. In 2021, the Service convened a new Recovery Team composed of 51 stakeholders (e.g., researchers, private citizens, wildlife biologists, natural resource managers, zoo biologists, etc.) (For a complete list of Recovery Team members see Appendix A) tasked with helping develop a revised recovery plan for the red wolf.

Additional recovery teams were convened for various purposes over the years. In 1999, a Red Wolf Recovery Implementation Team was convened to review Service progress as they implemented an adaptive management plan and to provide recommendations regarding adaptations to the plan (Service 2005, p. 2; Stoskopf et al. 2005, p. 1147). In 2015, the Service convened a recovery team to undertake an evaluation of the Red Wolf Recovery Program to determine the actions needed to achieve recovery of the red wolf and assess the extent to which those actions could be implemented on the landscape (Group Solutions 2016, p. 5).

Current Species Status

Today, there are approximately 230 red wolves in the captive population. The ENC RWP – currently the only known population in the wild – grew to a peak of 100-120 red wolves in 2012. However, the population has since rapidly declined, mainly due to anthropogenic mortality (e.g., gunshot and vehicle strikes) (USFWS 2022). Details on the Service's understanding of the life history needs and species condition can be found in the SSA (Service 2018).

Due to the declining population size and mortality of one or both red wolves in established breeding pairs, there were no known red wolf pups born in the wild in 2019, 2020, or 2021. In January of 2022, there was an estimated total of 15-17 red wolves, with 8 known (collared) red wolves, in the ENC RWP. The Service is currently implementing actions, such as adaptive management (e.g., coyote sterilization), translocation of red wolves from an island propagation site on St. Vincent NWR, and releases of red wolves from the captive population into the ENC RWP, to create new red wolf breeding pairs. Additionally, the Service is pursuing pup fostering to increase the population in the wild. As a result of management actions taken in 2020 and 2021, a litter of red wolf pups was born in the wild in 2022.

Our assessment of the species' viability, defined as the ability of the species to persist and maintain populations in the wild over time, is based on the concepts of resiliency, redundancy, and representation (Service 2018, pp. 10-12). The SSA framework uses the principles of resiliency, redundancy, and representation (i.e., "the three Rs"; Wolf et al. 2015, entire; Service 2016, entire) to assess a species' viability at specific points in time. A species with a high degree of resiliency, representation, and redundancy is better able to adapt to novel changes and to tolerate environmental stochasticity and catastrophes. In general, species viability will increase with increases in resiliency, redundancy, and representation (Smith et al. 2018, p. 306).

The concepts of resiliency, redundancy, and representation are:

Resiliency is the ability of a species to withstand environmental stochasticity (e.g., normal, year-to-year variations in environmental conditions such as temperature, rainfall), periodic disturbances within the normal range of variation (e.g., fire, floods, storms), and demographic stochasticity (e.g., normal variation in demographic rates such as mortality and fecundity). Measured by the size and growth rate of each population, genetic health, connectivity, and habitat quantity, quality, configuration, and heterogeneity. Resiliency is important because it gauges the probability that the populations comprising a species are able to withstand or bounce back from environmental or demographic stochastic events.

Redundancy describes the ability of a species to withstand catastrophic events. Measured by the numbers and distribution of populations relative to the scale of potential catastrophic events. Redundancy is important because it gauges the probability that the species has a margin of safety to withstand or can bounce back from catastrophic events.

Representation describes the ability of a species to adapt to both near-term and long-term changes in the species' physical and biological environments (i.e., adaptive capacity). We can best gauge representation by examining the breadth of genetic, phenotypic, and ecological diversity found within a species and its ability to disperse and colonize new areas. Representation is important because it gauges the probability that a species is capable of adapting to environmental changes.

For the red wolf to maintain viability, its populations, or some portion of its populations, must be resilient. Resilient red wolf populations occupy habitats of sufficient size to sustain growing, reproducing populations of adequate size to withstand introgression pressure and produce viable offspring that reach maturity and expand the population through the formation of new packs. Therefore, the general needs of the red wolf for viability are (Service 2018, pp. 28-29):

- Adequate Numbers – to establish and maintain pack structures, defend territories, produce viable offspring, and find suitable mates (i.e., sufficient unrelated, conspecific individuals to prevent selection of heterospecific mates);
- Adequate Habitat – to support multiple packs and provide sufficient resources for packs to complete all components of its life history and avoid anthropogenic mortality at a rate which will facilitate population maintenance;
- Genetic Diversity – sufficient captive and wild stock to support genetic diversity goals and sufficient capacity within the captive population to maintain or improve genetic diversity (based on the 12 founder lines) while supporting releases; and
- Multiple Resilient Populations within the Historic Range – multiple populations are likely needed to protect against catastrophic loss.

The only red wolf population in the wild (ENC RWP) has been largely declining since 2012 and is at risk of extirpation due to low resiliency associated with declining growth rate (higher mortality than reproduction), risks due to demographic stochasticity characteristic of small population size, and low redundancy and representation associated with a single wild population. Additionally, the captive population has been limited in its ability to grow (though recent investments to increase space is relieving some of this pressure) and recently has largely been used to maintain the already limited genetic diversity from the 12 founding individuals that have living descendants in the captive stock today. Therefore, the red wolf is currently not resilient

and cannot become resilient without intervention (Service 2018, pp. 29-30, 70). There is only one known red wolf population in the wild and the distribution of that single population is not sufficient to withstand a single large catastrophic event; therefore, the species currently has no redundancy in the wild. Without establishing new wild populations, the species is unlikely to have redundancy in the future. The captive population represents the genetic fail-safe for the entire population and much of the future recovery potential for the species. Twelve of the original fourteen genetic lines are still represented in the captive population; therefore, some genetic diversity has been maintained. Into the future, expansion of the captive population should maintain genetic diversity while providing future releases as necessary to support wild populations (Service 2018, pp. 31, 71). There is currently limited representation in the wild. Until natural populations of sufficient size are established and recruiting, maintaining representation in the wild will be difficult.

Current Species Threats

We assess "threats" to a species during our determination of whether a species is a threatened or endangered species due to any of the five factors in the Act:

A) the present or threatened destruction, modification, or curtailment of its habitat or range;
B) overutilization for commercial, recreational, scientific, or educational purposes;
C) disease or predation;
D) the inadequacy of existing regulatory mechanisms; and
E) other natural or manmade factors affecting its survival

Below are factors affecting the species. Factors in bold were identified in the SSA and by the Recovery Team as the primary threats to the species (Service 2018, pp. 31-54; CPSG and Service 2021, pp. 8-15).

- Future habitat loss from development (wild population)
- Future habitat loss from sea level rise and increased flooding (wild population)
- Disease and parasites (captive and wild population)
- Intraspecific strife (territorial competition between red wolves) (captive and wild population)
- **Anthropogenic-related mortality** (e.g., gunshot, vehicle strikes, management mortality, poisoning, and suspected illegal activity) (wild population)
- **Coyote hybridization/introgression** (wild population)
- **Small population size and associated inbreeding depression** that decrease species resiliency and exacerbate impacts of other threats (captive and wild population)
- **Negative public perception** of canids that may undermine recovery efforts and could exacerbate some threats above (wild population)

United States Department of the Interior

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In Reply Refer To:
FWS/R4/ES/078025

January 20, 2023

Ms. Collette Adkins
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Dear Ms. Adkins:

Thank you for your May 24, 2016, "Emergency Petition to Revise the Red Wolf's 10(j) Rule" (2016 Petition or Petition). As you are aware, the Center for Biological Diversity (CBD) submitted a FOIA dated June 15, 2022, seeking all records discussing the 2016 Petition. Regional U.S. Fish and Wildlife Service Staff became aware of your 2016 Petition after conducting a search for records responsive to CBD's 2022 FOIA and failing to locate any responsive records. Accordingly, we now consider your request in the context of events that have transpired since May 2016.

At the outset, we would like to note that much has changed since you submitted your Petition. Specifically, management of the Eastern North Carolina red wolf population (ENC RWP) is conducted in accordance with the 10(j) rule published in 1995, as now clarified by relevant court orders. Notably, this includes a permanent injunction prohibiting take of red wolves either directly or by landowner authorization, without first demonstrating that the red wolf is a threat to human safety or the safety of livestock or pets. Additionally, the Service has acknowledged the 1995 rule provides authority to release additional red wolves and conduct adaptive management within the ENC RWP. Consistent with that authority, we have been releasing captive born red wolves into the ENC RWP, pup fostering where opportunities exist, and conducting adaptive management as appropriate to reduce coyote hybridization.

We have revitalized our commitment to red wolf recovery and to the red wolf population in the ENC RWP. We recognize that we cannot recover the red wolf alone and are diligently working towards increasing our focus on collaboration and community and partner engagement to recover this species. As part of this revitalization, we are working to provide support to landowners and stakeholders by increasing engagement, communication, and transparency in all our actions.

Response to Emergency Petition to Revise the Red Wolf's 10(j) Rule

Your Petition requests that we revise the current red wolf regulations under Section 10(j) of the Endangered Species Act (Act) in order to reintroduce the red wolf to additional areas, reclassify all reintroduced populations of red wolves as "essential" experimental populations, and reduce shooting deaths. We address each request in turn below.

I. Request to Reintroduce Red Wolf Populations to Additional Areas

Your Petition seeks to revise the existing 10(j) rule for the ENC RWP to require reintroduction of red wolves to additional areas.

Your Petition continually references the 1990 Recovery Plan as support for your position. However, subsequent to your Petition, CBD filed a lawsuit against us seeking a commitment from the Service to revise the 1990 Recovery Plan. We settled that lawsuit by agreeing to revise the recovery plan for the red wolf by February 28, 2023. While the draft revised recovery plan has been made available for public comment, it has not been finalized. We anticipate that the finalized revised red wolf recovery plan will guide our efforts towards future reintroductions. Accordingly, at this time, we decline to revise the 10(j) rule for the ENC RWP to require reintroductions to additional locations. Additional rulemaking would be required in the future to authorize the release of any red wolves outside of the current ENC RWP.

II. Request to Consider Red Wolf Populations Essential

Your Petition also seeks to reclassify the ENC RWP as "essential" rather than "non-essential" under section 10(j) of the Act. The provisions for classifying listed species as "non-essential" or "essential" experimental were provided by 1982 amendments to the Act. These provisions were designed to resolve the dilemma of significant local opposition to translocation efforts due to concerns over the rigid protection and prohibitions surrounding listed species under the Act. The resolution was to provide new administrative flexibility for selectively applying the prohibitions of the Act to experimental populations. Final regulations establishing procedures for designation of experimental populations, determination of such populations as "essential" or "non-essential," and promulgation of appropriate protective regulatory measures were published in the Federal Register on August 27, 1984 (49 FR 33885).

The FWS designated the ENC RWP as a "non-essential" experimental population in its 1986 Final Rule on "Determination of Experimental Population Status for an Introduced Population of Red Wolves in North Carolina." At that time, we found non-essential status appropriate because the species was secured in captivity such that the population was not essential to the species' continued existence (51 FR 41790). We are not required to revisit the essentiality determination where we are not authorizing the release of any population of an endangered species outside the current range of such species. 16 U.S.C. § 1539(j)(2)(A), (B). Accordingly, we decline to do so here. Also, to the extent the Petition seems to ask us to consider populations of red wolves that are reintroduced in the future to be essential, we find that decision to be premature.

Any future reintroduction of red wolves in a different area will require further rulemaking and an "essentiality" determination at that time.

Further, the management flexibilities that result from the non-essential determination are instrumental to support of the red wolf program and ultimately red wolf recovery. These provisions were necessary to obtain public support for attempts to reintroduce red wolves and were, therefore, an essential ingredient in reestablishment of the species. Prior to these provisions, attempts to reintroduce red wolves and other endangered species, particularly predators, were routinely unsuccessful because of local opposition. However, the use of the term "nonessential" should not be misconstrued as indicating a lack of value of the North Carolina population of red wolves. Given that frequent misunderstanding by the public, we have recently rebranded the North Carolina non-essential experimental population (NC NEP) as the Eastern North Carolina red wolf population or ENC RWP in documents and outreach materials. Nevertheless, this change does not alter the non-essential status of this population under the Act.

III. Request to Revise 10(j) Rule to Avoid Shooting Deaths

You note several concerns with the 10(j) rule as it was implemented at the time of your Petition. First, you expressed concern that the exception stating "[a]ny person may take red wolves found on private land" if "such taking is not intentional or willful" allows anyone to say they mistakenly killed a red wolf by claiming that they believed it was a coyote—and thereby fall within this exception. You request that we remove this exception. However, as your Petition recognized, the U.S. District Court for the Eastern District of North Carolina preliminarily enjoined coyote hunting in the ENC RWP in May 2014. Red Wolf Coal. v. N.C. Wildlife Res. Comm'n, No. 2:13-CV-60-BO, 2014 U.S. Dist. LEXIS 65601 (E.D.N.C. May 13, 2014). Subsequently, a settlement agreement was entered into that prohibits night hunting of coyotes in the recovery area and provides other red wolf protections. Additionally, most recently, all known red wolves have been fitted with bright orange collars so that they are more easily identifiable and distinguishable from coyotes. Further, we are working with the community to raise awareness and help hunters and landowners avoid accidental shootings.

Second, you express concern that the 10(j) rule also allows private landowners or their agents to take red wolves that are "in the act of killing livestock or pets" and ask that this be modified to allow harassment, but not injury or death. In the history of the program, there have only been 9 documented livestock or pet depredations; not all instances included the killing of a red wolf. However, while the exception has rarely been invoked, it is highly objectionable to owners of livestock and pets to be unable to kill a predator that is engaged in killing their livestock or pets. This, in turn, leads to the erosion of public support for these predator reintroductions, and public support is paramount if this effort is to be successful. While we work with landowners to ensure injury or death is not necessary, we continue to find this exception is important to landowners in order to increase tolerance for wolves on their property.

Next, you state that a problematic aspect of the 10(j) rule is that it exempts any take on public land that is "incidental to lawful activities, is unavoidable, unintentional, and not exhibiting a lack of reasonable due care" and ask that it be eliminated. As we discussed in the preamble of

our 1995 revisions to the 10(j) rule for the red wolf, our experiences at Alligator River National Wildlife Refuge supported a need for this provision and we did not detect any misinterpretation of the provision by private citizens. We continue to find that to be the case.

You also expressed your concerns over the provision providing that private landowners may kill wolves if federal attempts to "capture such animals have been abandoned." 50 C.F.R. 17.84(c)(4)(v). You request removal of this provision. As you are aware and as mentioned above, in 2018 the U.S. District Court for the Eastern District of North Carolina permanently enjoined the taking of red wolves, either directly or by landowner authorization, pursuant to 50 C.F.R. §§ 17.84 (c)(4)(v) and (c)(10) without first demonstrating that those red wolves are a threat to human safety or the safety of livestock or pets. Thus, this provision no longer provides an allowance for take separate and apart from 50 C.F.R. § 17.84(c)(4)(iii). Accordingly, it has effectively already been removed.

Finally, you request that a revised 10(j) rule remove reference to defense of human life, stating that this provision "perpetuates negative public attitude." However, we find that this provision is important in building community and landowner tolerance of red wolves, and, as you point out, Section 11(a)(3) of the ESA already provides this exception to the prohibition on take of listed species.

For these reasons, we find that the existing 10(j) rule for the ENC RWP, as modified and clarified by existing court orders, currently provides us with sufficient tools to manage the ENC RWP. However, we may reconsider this issue as we finalize our revised recovery plan—as discussed above—and develop our recovery implementation strategy.

For all the reasons provided above, we deny your Petition to revise the red wolf 10(j) rule. We appreciate your interest in red wolf conservation and look forward to collaborating with you to achieve recovery.

Sincerely,

Mike Oetker
Acting Regional Director

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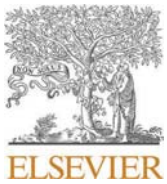

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Majority positive attitudes cannot protect red wolves (*Canis rufus*) from a minority willing to kill illegally

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ABSTRACT

In January 2021, there were 7 known individual red wolves (*Canis rufus*) remaining in the only wild population, located in Northeastern North Carolina (NENC). Anthropogenic mortality is the largest threat to survival of this population. Leading theory predicts that by understanding the attitudes and behavioral inclinations of the general public toward red wolves, better decisions can be made about how and where to concentrate outreach and interventions. Another view is that a very small minority of individuals must refrain from killing endangered species before restoration can succeed, so research and interventions need to focus on those few. We conducted interviews and surveys in nine counties in and around the NENC reintroduction area to measure attitude and behavioral inclinations toward red wolves, acceptance of the red wolf recovery program, and trust in the lead agency. We used two sampling techniques and in both samples pluralities or majorities liked red wolves, supported their restoration, disliked policy that would limit red wolf protections, trusted the agency, and would not kill a wolf illegally. While these data seem favorable for red wolf recovery, our results show a small group of people are driving the species to extinction through poaching. Self-identified male hunters in the probability group reported the greatest inclination to poach, with 11% saying they would kill any wolf they encountered on their own. We recommend engaging peer processes that discourage illegal behaviors and focusing energetic anti-poaching interventions on hostile actors to restore red wolves in this human dominated landscape.

1. Introduction

Restoring endangered species and protecting them in the long-term is a complex and difficult task worldwide, especially when they are controversial large predators. Critically endangered red wolves, *Canis rufus* were extinct in the wild and had been absent for over 100 years from eastern North Carolina when they were reintroduced from captive-born individuals in 1987 (Barclay, 2002; USFWS, 2020a). Once abundant throughout the eastern US from the Atlantic Coast west to Texas and from the Gulf of Mexico north to the Ohio River Valley and central New York, red wolves were eradicated, in part through government sponsored eradication programs, as Europeans migrated and settled throughout the US east of the Mississippi (Gilbreath & Henry, 1998). Wolf bounties were awarded in North Carolina in the late 1700's and red wolves were eradicated from the state by the late 1800's (Barclay, 2002; Mech and American Museum of Natural History, 1970; Webster et al., 1985). In 1967, they were designated as endangered and became one of the first species listed under the U.S. Endangered Species Act (ESA) (Hinton et al., 2013). They were reintroduced into northeastern North Carolina (NENC) in 1987 beginning with four pairs of wolves into Alligator River National Wildlife Refuge (ARNWR), but their populations grew slowly and then diminished again recently, mainly being threatened by high rates of poaching (Hinton et al., 2016b) to a low of only 7 known wolves in December 2020 (USFWS, 2020b). Poaching was the major cause of mortality (51–64%), whether or not one includes estimates of cryptic poaching (3–30%), followed by vehicle collisions (15–21%) and legal killing (6%) (Agan et al., 2021). Critical to their survival will be revealing the psycho-social, political, attitudinal, and behavioral mechanisms leading to poaching (illegal killing), part of which this research will investigate.

Scholars and agencies assume that positive attitudes in the broad public will promote conservation of endangered species while negative attitudes may hinder (Jørgensen, 2013; Zajac et al., 2012; Clark, 2009). Attitude surveys have been a primary tool for assessing perceptions of natural resources including wolves (Manfredo, 2008). The Theory of Planned Behavior (TPB) predicts an individual's intentions to perform a

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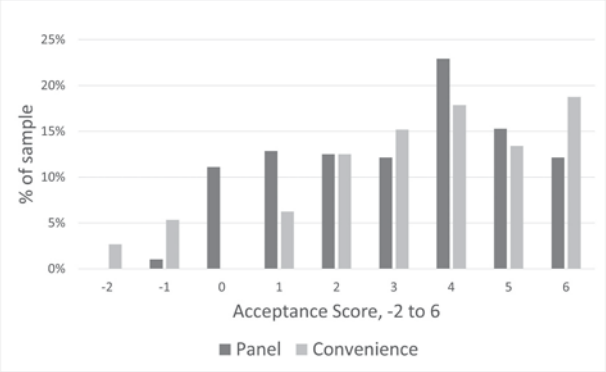

Fig. 4. Acceptance for red wolves, the recovery program, and trust for USFWS summing four survey items by sample (probability vs convenience). The acceptance scale ranged from −2 to 6 where higher values indicate higher acceptance.

were no significant differences between the two samples, but within the convenience sample, hunters had a lower median acceptance score than nonhunters (median of 2 (range 0–4) and 4 (range 3–5) respectively, $z = 3.68$, $P < 0.001$) and males had a lower median acceptance score than females (median of 3 (range 1–4) and 5 (range 3–6) respectively, $z = -3.39$, $P < 0.001$). With a midpoint of 2.0, 63% of the probability sample and 65% of the convenience sample had acceptance scores above 2.0 showing a high overall acceptance of the red wolf program (Fig. 4) (Appendix 2, Table 3).

3.3. Behavioral inclination

We measured behavioral inclination using two items (Q11 and Q14) (Appendix 1) summed for a range of possible values from 0 to 9. Question 11 asked, "It's currently against the law for a private citizen to kill a red wolf except in defense of life (human, livestock, or pets). Are there any other situations you might try to kill a red wolf anyway?" and the respondent could select all that applied, adapted from (Browne-Nuñez et al., 2015). Options included (1) "any wolf I encounter on my own", 2) "the wolf did not run away from me when I was on foot", 3) "the wolf did not run away from my vehicle", 4) "the wolf was on my property", 5) "the wolf came too close to my home", 6) "the wolf approached my pet or farm animals", 7) "I would not kill a red wolf", 8) "I would support someone else killing a red wolf', and 9) "other". If the latter indicated a situation in which the respondent would kill a wolf, we scored it as a one and added one point for each and every response other than (7), which scored zero. Therefore Question 11 ranged from 0 to 8. We then summed that with the result of question 14 which asked, "What would you do if you saw a red wolf on your property?" Choices included 1) "I would try to protect it", 2) "I would watch it", 3) "I don't know", 4) "I would call the authorities", 5) "I would try to kill it", 6) "I would try to scare it away", 7) "I would ignore it", and 8) "other". We counted each response to Q14 as "non-lethal" (zero), but for response (5) which added one to the sum of Q11 above to make our composite score with a potential maximum score of 9.

For behavioral inclination index, participants' scores ranged from 0 to 9 with higher numbers representing a higher number of situations in which they would make a lethal choice. The probability sample had a significantly lower index than the convenience sample, meaning they would choose to kill a red wolf in fewer situations (Table 2) (Appendix 2, Table 4). Hunters showed a significantly higher inclination to poach than nonhunters in both the probability sample and the convenience sample. Males had a significantly higher score than females only in the convenience sample.

Our two samples differed significantly in self-reported inclinations to kill red wolves. The majority of the probability sample and a plurality of the convenience sample chose the nonlethal choices of "I would not kill a red wolf" (65% v 41% respectively, $\chi^2 = 18.30$, df = 1, $P < 0.001$), and the direction of difference between the two samples was the same for the minorities who chose "I would try to protect it" (15% v 6% respectively, $\chi^2 = 5.91$, df = 1, $P = 0.015$). The probability sample self-reported a significantly lower inclination to kill red wolves in each of the following lethal options: "the wolf did not run away from me when I was on foot" (19% v 7% respectively, $\chi^2 = 12.22$, df = 1, $P < 0.001$), "the wolf came too close to my home" (18% v 7%, $\chi^2 = 9.79$, df = 1, $P = 0.002$), and "the wolf approached my pet or farm animals" (47% v 17%, $\chi^2 = 37.86$, df = 1, $P < 0.001$).

Hunters in the probability sample were significantly less likely to choose "I would not kill a red wolf' than nonhunters (62% v 66% respectively, $\chi^2 = 9.47$, df = 1, $P = 0.002$) and more likely to choose "any wolf I encounter on my own" (11% v 2%, $\chi^2 = 10.04$, df = 1, $P = 0.002$). However, in the convenience sample hunters are significantly more likely than non-hunters to choose, "the wolf did not run away from me when I was on foot" (29% v 11%, $\chi^2 = 5.52$, df = 1, $P = 0.02$), "the wolf came too close to my home" (31% v 8%, $\chi^2 = 9.66$, df = 1, $P = 0.002$), "the wolf approached my pet or farm animals" (61% v 37%, $\chi^2 = 6.75$, df = 1, $P = 0.009$), and "I would support someone else killing a red wolf" (10% v 0%, $\chi^2 = 6.73$, df = 1, $P = 0.009$).

3.4. Correlations between attitude and behavioral inclination

Attitude toward red wolves (using the Likert scale of "strongly dislike" to "strongly like") and behavioral inclination index (0–9) above showed a significantly negative relationship to each other in both the probability sample ($r_s = -0.25$, $P < 0.001$) and convenience sample ($r_s = -0.54$, $P < 0.001$), meaning that respondents with positive attitudes toward red wolves had lower inclinations to poach them (Appendix 2, Table 5).

4. Discussion

Our goal was to measure attitudes toward red wolves and red wolf management along with respondents' behavioral inclinations to protect or kill red wolves they encountered, among those who live in and around the RWRA. Anthropogenic mortality is the largest threat to the survival of the only wild population of this species, and by understanding how people think about red wolves and their conservation, decisions can be made about how and where to concentrate outreach efforts and interventions. The USFWS explicitly states that the current regulations are not effective in fostering coexistence between people and red wolves (Kurth, 2018), and since the known population size is down to 7 wolves (USFWS, 2020b), urgent action is necessary to ensure survival. However, in our study we found a majority liked wolves, a plurality supported the recovery program, trusted the USFWS, disliked policy that would limit protections, and would not shoot wolves illegally. There is also a large percent who don't know or are neutral about the recovery program. Our interviews and survey responses reflect a distinction between attitudes toward red wolves and attitudes toward the recovery program which is important and leaves an opening for education and cooperation.

4.1. Sample characteristics

Our two samples were demographically different, and though complementary in age and other identity variables, both samples were also different from the census. While neither is representative of the general population, we believe their responses provide valuable information for conservation. Across a broad range of questions on social and political issues, Goel et al. (2015) estimates responses from a non-representative survey were generally well-aligned with GSS and Pew Research Center studies. Even representative surveys can suffer from non-response bias and sampling errors (Shirani-Mehr et al., 2018), and matching

demographics does not guarantee absence of bias on the variables of interest (Couper, 2000). Our study supports findings from different researchers using a variety of data-collection methods with different samples including two red wolf studies, which we believe adds support for the interpretation of our findings (Quintal, 1995; Rosen, 1997).

As with past wolf surveys in Wisconsin (Browne-Nuñez et al., 2015), salience of surveys about wolves to older respondents might explain the higher average age of our convenience sample and lower average age of our Qualtrics panel. Qualtrics panels "tend to be younger with 62% of the nationwide panel under the age of 34" according to an email from Qualtrics. Our results align with studies that show females to be more involved in animal advocacy than males (Herzog et al., 1991; Kellert and Berry, 1987; Peek et al., 1996), more self-reported advocacy in the younger generations (Bryan, 2008; Firkins, 2017), and more positive attitudes in those living outside wolf range (Karlsson and Sjöström, 2007; Treves et al., 2009). As expected, this resulted in differences between our two samples in measures of attitude with the probability sample being more positive toward red wolves and their conservation, a higher level of acceptance for the program and lower salience of our survey questions.

Differences between these two samples of respondents have practical implications for the USFWS and red wolf protection. This includes identifying who or what groups of people are most interested and knowledgeable about red wolves and those who are not, and results could inform the type of outreach and action needed in which locations. Reaching these different groups of stakeholders would be helpful to balance interests and seek reasonable solutions. When considering what actions to take, it may be useful to separately consider the attitudes and inclinations of a smaller population who know a lot about an issue compared to the majority who do not (Decker et al., 2002). An experimental study of tolerance for black bears conducted in Ohio found that information interventions did little to raise tolerance, but interventions that described the benefits that bears offered to people and to ecosystems were associated with tolerance for a larger bear population (Slagle et al., 2013). That same experiment revealed that if informational interventions included information on risks and prevention of damages by bears alone, tolerance declined, but combined with positive information on benefits, tolerance was higher than when presented with costs alone. These results have obvious implications for how the USFWS should lead with positive messaging on red wolves when they approach concerned or skeptical residents of the RWRA.

Because of constraints imposed by survey methods, we were unable to completely estimate response rate and non-response bias for both samples. Therefore, our results have some limitations we discuss in this paragraph, and we recommend future research account carefully for rate and bias to additionally validate our findings. A consequence of ignorance of non-response bias is the assumption that respondents represent non-respondents reached by our survey (which by itself is different from non-respondents' not reached by our survey). We have detected differences in salience between our two samples, suggesting that payment by Qualtrics to reach the probability sample of respondents could have elevated response among respondents for whom the material was not very salient or for topics those respondents knew little about. That makes our probability sample from Qualtrics possibly less relevant to the applied conservation problems facing the USFWS recovery program for red wolves because those respondents who knew little, or for whom the issue was not salient, are unlikely to influence the conservation program directly. In short, our samples emphasize the role of interested and informed individuals in influencing red wolf recovery, as opposed to the broad public, which may only influence it indirectly if at all. This is a limitation of our study for two reasons. First, the scientific limitation is that we are unsure of the accuracy and precision of our measurements for predicting the response of an individual, group, or the public. That imprecision and inaccuracy is somewhat mitigated by using closed questions (fixed responses), so we know we have not qualitatively distorted results. The second limitation is an applied one because our uncertainty about non-response bias could lead the agency to assume its public meetings are equally biased. We urge caution in jumping to that conclusion. Because public meetings are broadcast, attendees are self-selected, and interest group leaders may marshal large numbers of constituents to attend, public meetings are likely more biased to non-response than our surveys. Therefore, the limitations of our study imposed by unknown levels of non-response bias should not be construed as cause for dismissal, but instead viewed as a question of precision of estimates and systematic bias in one direction or another. By comparing our two samples of respondents, we address the issue of systematic bias in either sample. Finally, response rate sheds light on non-response bias. For example, if a small minority of individuals reached by the survey completed it, then our results might easily be overwhelmed by the attitudes of the larger majority non-respondents. Such a phenomenon could push our results in any direction, but we do have a safeguard against massive bias caused by low response rates. The safeguard is that Qualtrics paid its survey respondents to respond to this and other surveys. Therefore, the probability sample is likely to be representative of Qualtrics panel, albeit not of census population. In general, animals have high salience for people (Manfredo, 2008; Wilson, 1984), therefore our study with its two different samples provides a basis for comparison (convenience sample most biased by non-response and probability sample least biased by non-response). That comparison provides a degree of confidence that a low response rate does not equate to massive non-response bias.

4.2. Attitude, acceptance, and behavioral inclination

In their 2018 red wolf 5-year review, the USFWS stated they would not be able to recover the red wolf without private landowner support (Weller, 2018). Our results show that pluralities of both our samples had positive attitudes toward red wolves and their conservation. Compared to Quintal (1995), our study 23 years later shows positive attitudes toward red wolves have increased by 19%, negative attitudes decreased by 4%, and those who are neutral or don't know have also decreased by 19%, if one can compare the two surveys directly. Among our respondents, even high levels of support did not correlate with zero behavioral inclination to poach, and so the lack of success for this reintroduced species may include a broader range of factors that includes trust for the agency, policy, and other factors.

When considering tolerance for a particular species, trust increases perceptions of benefits and lowers risk perception (Zajac et al., 2012). While trust for the USFWS was relatively high, participants were more positive toward red wolves than toward the agency. There was also a high percentage of neutral attitudes, suggesting respondents had little basis for approving or disapproving of USFWS. In survey comments from the online questionnaire and interviews, participants shared frustration for the continued lack of communication between managers and the residents who are living near red wolves. Daley et al. (2004) showed that models of successful wildlife management programs in NC emphasized personal relationships with agency personnel and we echo their recommendation. Those authors concluded any management considerations would need to include local and regional attitudes (Daley et al., 2004). Increased communication and relationship building, when implemented both broadly and intentionally should reach the very small group willing to violate social norms by poaching.

The new USFWS red wolf policy proposal would limit protections of red wolves to federal lands on the Albemarle Peninsula, allowing take of red wolves on private land, whereas the current policy does not limit protection geographically. This gave us an opportunity to ask residents their attitudes toward that policy, and we found that a high number were either not aware of the policy proposal or did not understand it. Ultimately, we found limited support reported for this policy that would allow the killing of red wolves on private property. Recent work on the endangered Mexican wolf indicates loosening ESA protections for wolves resulted in more poaching and slower population growth

(Louchouarn et al., 2021). Further research would be needed to show if a more favorable policy toward red wolf survival would increase acceptance.

With the combination of the attitude measures discussed here, our acceptance variable, reflecting the current state of red wolf management, shows a high level of acceptance across all groups of our survey respondents even though the most recent policy proposal decreased acceptance scores. These types of acceptance measures are useful as a general indicator of the tolerance for a species in a particular location and context.

With such a small population of wolves, the loss of just one adult can have devastating effects on the wild population. Our respondents expressed an extremely low inclination to poach with medians of 0 to 1 out of a possible 9 for both samples and all groups and when compared to the Wisconsin study using the same behavior choices (Browne-Nuñez et al., 2015). This supports our belief that poaching is carried out by a small minority. However, male hunters had the highest mean behavioral inclination to poach and the lowest level of acceptance of any interest group. Hunters also have opportunity during hunting season where they will likely be carrying a firearm in areas with red wolf prey, and potentially red wolves. Therefore, communication, personal relationships and management interventions should focus on this interest group to reach the few who would kill a wolf illegally.

4.3. Recommendations beyond North Carolina, USA, and beyond red wolves

Many protected areas such as those found in the North Carolina RWRA, are usually too small and fragmented to contain wide-ranging species such as large carnivores (Woodroffe and Ginsberg, 1998), that will disperse into surrounding land, seeking territory as their population grows. As red wolves continue to move outside of protected areas and onto private lands, poaching has inhibited recolonization (Agan et al., 2021). For endangered species in small ranges or reintroduced to small, protected areas, we recommend prioritizing investment in the major cause of mortality for such populations. As resources for enforcement are often very limited, we recommend a focus on poaching and the social norms that seem to promote it.

Trust of the surrounding community will probably be essential to identifying poachers and succeeding in law enforcement. Several studies report that poachers are a small minority with specialized skills or habits such as in tropical lowlands (Naughton-Treves et al., 2003) and for drier savannas (St John et al., 2012), or that would-be poachers seem numerous, yet the opportunity to poach elusive species is rarely encountered as with gray wolves (Treves et al., 2017) and Jaguars (Marchini and Macdonald, 2012).

Some hypothesize that targeted communications by agencies and support within communities is key to reducing poaching. For example, a 2019 study of Swedish hunters found that poaching was rare compared to the number of hunters afield and a high percent of hunters would report poaching to the authorities (Peterson et al., 2019). Both suggest community support for protection and opposition to poaching. Appealing to law-abiding hunters and the community in which poachers are embedded may help to reach that small group of hunters who engage in this illegal activity or encounter an opportunity (Treves et al., 2017; Peterson et al., 2019). Bergseth et al. (2017) also recommended targeted communication that influenced the belief or perception surrounding illegal activity for those who care about fish reserves and other approaches that increased the perceived likelihood of detection by law enforcement for more opportunistic poaching. An African primate study showed sanctuaries have moved toward implementing development activities aimed at poverty reduction coinciding with poaching, and identifying hotspots of poaching to strengthen law enforcement (Kahler and Gore, 2012).Authorities should beware of incentives to stop poaching that only stop a subset of the poaching (Persson et al., 2015) and should be particularly wary of policies that ignore hidden poaching in favor of reported poaching (Louchouarn et al., 2021; Santiago-Ávila et al., 2020; Treves et al., 2017). These examples reinforce our conclusion that targeted communication and enforcement along with agency trust is critical to acceptance of the red wolf program.

Communities may not know exactly where poaching is highest-risk and not all communities may evince social norms for or against poaching (Kahler et al., 2013; Kahler and Gore, 2012), but the alternative to community outreach and trust-building programs seems to us to be intensive patrolling and interdiction campaigns by authorities that are not based in the community. If poachers come from outside the range of the controversial species, financial incentives promote poaching, or internal community norms favor the poachers (Clarke and Rolf, 2013; Pohja-Mykrä and Kurki, 2014; Sharma et al., 2014), more militaristic responses may be needed. While it is tempting for an agency like the USFWS to turn a blind eye to poaching for the sake of the agency's reputation and relationships, there are alternative views of community-based conservation. Namely, fair, and consistent law enforcement that seeks justice for all, emphasizes partnerships, and can anticipate problems before a red wolf is killed, may provide another path to successful recovery and support for the USFWS. The ESA is the law of the land and many communities pride themselves on being law-abiding (Cheng and Sturtevant, 2012; Partington, 1990; Peterson et al., 2019). Indeed, we do not think the USFWS needs to militarize against poaching in the red wolf recovery area because the majority of our respondents view red wolves favorably. Yet loosening ESA protections sends the wrong signal that red wolves have less value now, when in fact each one has greater value due to their scarcity (Chapron and Treves, 2016; Louchouarn et al., 2021; Santiago-Ávila et al., 2020).

Whether recovery in North Carolina is a success or failure, we need to understand how management can be improved in the future based on the experience of those in current recovery areas. For all wildlife populations where poaching is a problem, managers need to understand who is poaching, why they poach and why the problem continues to persist in order to make good decisions to stop such behavior and enhance future recovery of the species. Our study revealed that even with high acceptance and positive attitudes, negative attitudes and the behavioral inclination to poach of a small minority of the human population could lead to negative consequences for recovery of a critically endangered population.

5. Conclusion

Outlook should be favorable for red wolf recovery if attitudes of the general public were strongly influential. However, even though our study reflected a majority hold positive attitudes, our results show a small group of people are driving the species to extinction through illegal killing even without normative support. Some interest groups and individuals are pushing the USFWS to loosen ESA protections or even abort the recovery (Kurth, 2018).

Our study highlights the importance of relationship between agency personnel and residents, not only in response to wolf-human interactions but throughout the entire process of recovery including decision-making. It is also evident that illegal killing is acceptable to reveal in a survey and so might be an acceptable social norm among a minority of residents in the RWRA. This makes it particularly important to focus interventions such as outreach, law enforcement, and anti-poaching interventions generally on those groups with the negative attitudes and the inclination to poach. Most critical are proven interventions that mitigate poaching while building human-wolf coexistence. We do not yet understand why red wolf poaching has been a problem for so long, and solutions to it have been ineffective. Since this study focused on those living in and around the RWRA, perhaps a next step would be an anonymous survey among USFWS personnel and others who have worked in red wolf recovery over the last 30 years to gain a more holistic perspective.

Currently we do not know what the future for red wolves in NENC

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Evaluating how lethal management affects poaching of Mexican wolves

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Despite illegal killing (poaching) being the major cause of death among large carnivores globally, little is known about the effect of implementing lethal management policies on poaching. Two opposing hypotheses have been proposed in the literature: implementing lethal management may decrease poaching incidence (killing for tolerance) or increase it (facilitated illegal killing). Here, we report a test of the two opposed hypotheses that poaching (reported and unreported) of Mexican grey wolves (*Canis lupus baileyi*) in Arizona and New Mexico, USA, responded to changes in policy that reduced protections to allow more wolf-killing. We employ advanced biostatistical survival and competing risk methods to data on individual resightings, mortality and disappearances of collared Mexican wolves, supplemented with Bayes factors to assess the strength of evidence. We find inconclusive evidence for any decreases in reported poaching. We also find strong evidence that Mexican wolves were 121% more likely to disappear during periods of reduced protections than during periods of stricter protections, with only slight changes in legal removals by the agency. Therefore, we find strong support for the 'facilitated illegal killing' hypothesis and none for the 'killing for tolerance' hypothesis. We provide recommendations for improving the effectiveness of US policy on environmental crimes, endangered species and protections for wild animals. Our results have implications beyond the USA or wolves because the results suggest transformations of decades-old management interventions against human-caused mortality among wild animals subject to high rates of poaching.

1. Background

Human-caused mortality is the major cause of death among large, terrestrial, mammalian carnivores worldwide [1], including the

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Liberalizing the killing of endangered wolves was associated with more disappearances of collared individuals in Wisconsin, USA

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Although poaching (illegal killing) is an important cause of death for large carnivores globally, the effect of lethal management policies on poaching is unknown for many populations. Two opposing hypotheses have been proposed: liberalizing killing may decrease poaching incidence ('tolerance hunting') or increase it ('facilitated poaching'). For gray wolves in Wisconsin, USA, we evaluated how five causes of death and disappearances of monitored, adult wolves were influenced by policy changes. We found slight decreases in reported wolf poaching hazard and incidence during six liberalized killing periods, but that was outweighed by larger increases in hazard and incidence of disappearance. Although the observed increase in the hazard of disappearance cannot be definitively shown to have been caused by an increase in cryptic poaching, we discuss two additional independent lines of evidence making this the most likely explanation for changing incidence among n = 513 wolves' deaths or disappearances during 12 replicated changes in policy. Support for the facilitated poaching hypothesis suggests the increase (11–34%) in disappearances reflects that poachers killed more wolves and concealed more evidence when the government relaxed protections for endangered wolves. We propose a refinement of the hypothesis of 'facilitated poaching' that narrows the cognitive and behavioral mechanisms underlying wolf-killing.

Globally, loss of large predators has contributed to simplification of trophic structures, lower biodiversity and degradation of ecosystem functions[1–3]. It is widely acknowledged that humans are responsible for more large carnivore deaths than any other cause[4], although the scientific debate about the sustainability of this killing remains far from settled for many large carnivore populations[3,5,6]. Many policies for large carnivores focus on limiting or regulating human-caused mortality, and many management decisions rely on estimates of human-caused mortality and on understanding the policy effects on such mortality. Therefore, biased estimates of human-caused mortality patterns can undermine policy goals and evaluations (e.g., recolonization by endangered species, restoring ecosystem processes), and harm carnivore population recovery or stability[5–7]. More broadly, accurate estimates of policy effects on illegal killing ('poaching' hereafter) of wild animals can improve enforcement of laws for nature protection and adherence to national and international treaties relating to the protection or the restoration of endangered species, ecosystems, biodiversity, and interdiction of unregulated wildlife trade.

Of all direct killing by humans, poaching is the primary cause of death in many carnivore populations[5,8–11], slowing population growth[12–14] or hindering recolonization of historic range[8,10]. Poaching is extremely difficult to detect, measure and prevent. Given its illegal nature, poachers often conceal evidence from management authorities tasked with monitoring marked animals. When authorities find the body of a poached animal they might detect that the individual was poached, but many wild animals die undetected. Measurement uncertainty rises from low but non-zero in the latter case to very high when poachers conceal evidence or when marked animals elude monitoring by those authorities. 'Cryptic poaching'[10] refers to this type of unreported, concealed

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to confounding effects increased as the intervals between resampling respondents decreased with each successive study.

The increases in incidence of monitored wolf disappearance (LTF) during liberalized killing periods suggest how the LTF component of cryptic poaching may obscure (at least part of) the additional mortality necessary to explain the slow-down in the population's annual growth rate from 2003 to 2011[22], and is consistent with increases in mortality over and above legal killing during said policy periods that were inferred to be responsible for population growth slow-downs[12,14]. Thus, the 'facilitated poaching' hypothesis seems the most plausible explanation for the rise in incidence of disappearances among Wisconsin's monitored wolves from 2003 to 2012. If this is indeed the case, LTF hazard rose because wolves faced an increased rate of cryptic poaching and incidence rose because the proportion of cryptically poached wolves increased.

The decrease we found in the incidence of reported poaching during liberalized killing policy periods might be interpreted as consistent with the 'tolerance hunting' hypothesis, which suggests that some lethal predator control may increase tolerance for the species and thus reduce poaching[17,18]. However, we cannot distinguish changes in reporting from changes in poaching with these data. In any case, looking only at the policy effect on reported poaching dismisses cryptic poaching, especially in light of evidence that most poaching goes unreported and thus underestimated in the Wisconsin wolf population and others[5,9,10]. Given the slight decreases in cumulative incidence of reported poaching that we found (approximately 0.02–0.03) and the more robust increases in LTF incidence (range 0.05–0.15 across our scenarios), it would suffice for just a portion of the suggested increase in LTF incidence to be attributable to cryptic poaching to (over)compensate for any decreases in reported poaching. For example, limiting the observed LTF incidence increase to the proportion of LTF wolves later found by means other than telemetry and found to have been poached (33%; a conservative minimum estimate) would still amount to a 0.02–0.05 incidence increase in cryptic poaching. Thus, our results undermine any claims of reductions in *total* (i.e., observed and cryptic) poaching from liberalized killing policies. (i.e., 'tolerance hunting'), contra Olson et al.[21,39].

Additionally, our results for reported poaching also seem consistent with another hypothesized relationship between legal killing and reported poaching from research in Finland. The notion of "cleaning up the numbers"[27], predicted a decline in reported poaching after increases in liberalized killing simply because fewer wolves are ;eft alive to be exposed to poaching. There seems to be no need to attribute this decline to human cognitive mechanisms (i.e., tolerance); wolves are simply killed legally at a higher rate (higher hazard and incidence) than they are reported poached during these periods (Tables 1, 2, Fig. 3). Indeed, we found that monitoring time (wolf collar transmitting) was associated with an increase in both the hazard and incidence of wolves being killed by government agents during liberalized killing periods. This result should not be ignored by decision-makers because it implies an (unplanned) accelerating incidence of legal killing during prolonged periods of liberalized killing. That is, once government agents are allowed to kill wolves, the likelihood of complaints or wolf deaths increased over time. Our present results seem to implicate human behavior in such a pattern, but further research is needed.

The 'facilitated poaching' explanation implies several non-mutually exclusive hypothetical mechanisms by which would-be poachers might respond to a policy signal to increase cryptic poaching. For instance, (a) would-be poachers feel emboldened by a perceived relaxation of anti-poaching laws during liberalized killing periods. This mechanism seems unlikely given cryptic poaching rose 2.5–7.5 times more than reported poaching decreased (Fig. 3). Alternatively (b), would-be poachers perceive a shift to social norms favoring their activities. This too seems unlikely given cryptic poaching remains covert while tolerance for poaching would seem to favor more overt poaching. Finally, (c) would-be poachers interpret wolves as having lower value because the government killing wolves suggests the population is too large. The latter hypothetical mechanism seems viable still and can be measured by classic valuation surveys, even perhaps conducted on the broad public rather than having to find would-be poachers to survey.

Our results also inform the literature on the effect of relaxing protections on environmental crimes. If we are correct in arguing the 'facilitated poaching' hypothesis is behind the suggested increases in cryptic poaching, then it seems that legalizing the killing of large nonhuman animals may drive their killing underground and perhaps motivate it, a hypothesis that has found support in research on the elephant ivory trade[40]. The increase in incidence of cryptic poaching we infer without an increase in reported poaching favors the idea that poachers remained averse to the risk posed by the state's authority to curb poaching (such as with increased enforcement or reestablishment of full federal protections). Here the observed decline in reported poaching incidence in census years 1995–2000 bears mention. Those years were associated with a change in methods to triple or more the number of wolf census-takers each winter[41]. Increasing human presence could have reduced either poaching activity or reporting (although there was no quantification of telemetry effort). The decline in unknown causes of death during the latter census period tends to support a view that additional volunteer census-takers each winter found more wolf carcasses—without any associated change in LTF during that same period. The role of census method requires further study therefore.

Given the scientific evidence suggesting continued declines in tolerance for wolves after the legalization of wolf-hunting in 2012[38], we hypothesize that cryptic poaching hazard and incidence may have increased after our study period. However, our study, results and scientific inferences are subject to various limitations. Our results are conditioned by any bias inherent in the WDNR data used, such as missing data for 26 wolves that we had to simulate and, in particular, measurement error for date of endpoint. The LTF endpoint is particularly susceptible to measurement error because wolves go LTF between monitoring intervals of weeks or months of unsuccessful monitoring, in most cases without reliable evidence with which to provide estimates of an actual LTF date. Time to event of LTF is the critical parameter in our analyses, not the number of wolves that went LTF, but regardless, the high proportion (119/231 = 52%) of wolves experiencing LTF during the first period of full protection (1979–31 March 2003, Supplementary Table S2) dismisses the concern that the absolute number of collared wolves in later periods potentially confounded our results. Our study is also limited by the lack of

Chapter 4

Evaluating Fact Claims Accompanying Policies to Liberalize the Killing of Wolves

Introduction

Worldwide consensus among ecologists provides strong evidence that predators can support ecosystem health and diversity out of proportion to their numerical abundances (Estes *et al.* 2011; Peterson *et al.* 2014; Ripple *et al.* 2014). For example, increasing evidence suggests that grey wolves (*Canis lupus*) play disproportionate roles in influencing deer (*Odocoileus* spp.) behavioral ecology, forest diversity and ecology, and perhaps even disease ecology and deer-vehicle collisions (Hebblewhite *et al.* 2005; Wild *et al.* 2011; Callan *et al.* 2013; Waller and Reo 2018; Tanner *et al.* 2019; Raynor *et al.* 2021), withstanding an ongoing debate over the strength of wolves' effects in Yellowstone National Park. Perhaps related, the U.S. public has become more positive about wolves over the past half century (George *et al.* 2016; Slagle *et al.* 2017). Nevertheless, in 2021, some U.S. state governments began pursuing rapid efforts to reduce wolf populations through programs that included incentivized hunting (e.g., bounties) and liberalized (even unlimited) hunting, trapping, and hounding seasons. These policies differ from previous policies that balanced different interests in living and dead wolves, and which allowed wolves to maintain and sometimes increase their populations (Brown 2008; Bruskotter *et al.* 2010, 2011, 2013). For example,

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G. Proulx, editor. Alpha Wildlife Publications, 2024.

Wisconsin reduced its wolf population by >27% in <1 yr and then proposed a second wolf-hunt in the same year (Treves *et al.* 2021a; Treves and Louchouarn 2022); Idaho, Montana, and Wyoming politicians articulated a goal to reduce their wolf populations even more; for Idaho by 90% (Oppie 2021) and enacted policies to help to reach that goal in 2021 and 2022 (Brown and Samuels 2021).

Here we address 4 fact claims (assertions of fact) commonly provided in policies for permitting or encouraging an increase in the legal killing of wolves and other large carnivores: (1) increasing human safety, (2) raising human tolerance for surviving wolves, (3) preventing livestock loss, and (4) increasing wild ungulate populations. We evaluate the fact claims (hereafter 'claims') by summarizing published scientific meta-analyses and systematic reviews in addition to reviewing >36 newer scientific studies on the social and ecological effects of killing wolves.

Claim 1− Killing wolves will increase human safety

Wolves can, and in rare circumstances have, attacked people (Linnell and Bjerke 2002; McNay 2002; Linnell *et al.* 2021). Thus, one justification governments provide for killing wolves has been to increase human safety. In Appendix 1, we present reports and statements by officials from the States of Michigan, Idaho, and Montana that show how claims about human safety have been used to raise fears or justify government funding and promotion of wolf-killing programs (including both the legalization and the liberalization of existing legal mechanisms, hereafter simply wolf-killing). Despite such warnings, no humans have been killed by wolves in the Northern Rockies since their reintroduction and no humans have been killed in the western Great Lakes region since written records have been kept. Wolves pose so little risk to people that aggressive killing programs proposed by U.S. states are almost certainly unable to reduce risk further as the following reviews showed.

Linnel and Bjerke (2002) and Linnell *et al.* (2021) compiled documented reports of wolf attacks on humans. The more recent study found evidence of 489 human victims of wolf attacks spanning 2002 to 2020 around the world, 26 of which were fatal, plus an equal number that were either too poorly documented to verify or almost certainly not caused by wolves. Rabies explained 77% of the above attacks and 59% of fatalities, and the geographic distribution of attacks correlated with rabies incidence across Eurasia. These researchers classified 14% of attacks as "predatory", which accounted for 36% of the fatalities. The remaining attacks were classified as "provoked/defensive". In Europe and North America, they "found evidence for 12 attacks (with 14 victims), of which 2 (both in North America) were fatal across a period of 18 years" (Linnell *et al.* 2021, p.3); however, there remains disagreement about the involvement of wolves in the Saskatchewan case, with investigating experts disagreeing with the provincial inquest, and a third opinion offered by independent investigators (P. Paquet, 2023 personal communication; report missing). Linnell *et al.* (2021) concluded "Considering that there are close to 60,000 wolves in North America and 15,000 in Europe, all sharing space with hundreds of millions of people it is apparent that the risks associated with a wolf attack are above zero, but far too low to calculate." (Linnell *et al.* 2021). Occasionally, wolf attacks may be precipitated by incidents of accidental or purposeful conditioning of wild wolves, whereby wolves learn to associate humans with food or lose fear of people via habituation (McNay 2002). However, there is no evidence that such behavior is now as widespread as it may have been before the 20th century when wild prey were more scarce (Linnell and Bjerke 2002). Indeed, Linnell and Alleau 2016, p.364) wrote that recent and historical predatory attacks on people in Europe "…are all associated with a very specific set of circumstances… [including]… landscapes with very fragmented habitat, low densities of wild prey, wolf dependence on livestock and anthropogenic foods, and high human densities living poor rural lifestyles." Given the recolonization and repopulation of many wild prey populations eaten by grey wolves, the conditions for wolf attacks on people, such as hungry wolves or wolves habituated to feeding on carcasses of livestock or humans, have probably diminished. Therefore, they concluded, "Despite the need to recognize that the potential for wolf attacks on people is greater than zero and management plans and procedures should take these into account, it is still so small that it is impossible to calculate in a meaningful manner" (Linnell and Alleau 2016, p.365).

Finally, a rabid or threatening individual wolf might be seen as a hazard necessitating a law enforcement response. However, that situation bears no logical relationship to a policy that implements widespread wolf-killing to address perceived threats to human safety. The 2 North American fatalities cited above are alleged to have occurred in Alaska, U.S. and Saskatchewan, Canada, rather than the jurisdictions whose governments we referenced above that have recently enacted policies of widespread wolf-killing. Even if one adds human injury cases to the tally, the odds that non-selective, public hunting, trapping, or hounding methods to kill wolves over wide areas will remove the rare wolf that attacks a human seem too low to calculate. Because our purpose is to evaluate the governmental claims relating to human safety (Appendix 1) − rather than the reality of fear of wolves or the possible rhetorical gains a politician might perceive from claiming to protect human safety − we must conclude that this claim is unsupported by evidence.

Claim 2−Killing wolves will increase human tolerance for wolves

Governments often claim that killing wolves increases public tolerance (or decreases intolerance) for wolves and their conservation (Refsnider 2009; Bruskotter *et al.* 2013; Chapron and Treves 2017a; Epstein *et al.* 2019). For example, the U.S. Fish & Wildlife Service in federal court in 2005 tried unsuccessfully to convince a federal court that allowing some legal killing of wolves would benefit their recovery and slow illegal killing. Yet, scientific evidence indicates that policies that liberalize the killing of wolves generally have not improved public tolerance for wolves (Treves and Bruskotter 2014). At most, following legalization or liberalization of wolf-killing, some scientists documented a decrease in self-reported tolerance in small demographic groups, such as male residents of grey wolf range in Wisconsin who are familiar with hunting (Hogberg *et al.* 2015), or respondents' own forecasts of increased tolerance among livestock owners (Hogberg *et al.* 2015; Richardson 2022). The claims surrounding self-reported improvements in tolerance have rarely been tested objectively.

The best evidence for change in individual attitudes as a result of policy changes for wolf-killing comes from the U.S., where researchers assessed human attitudes using long-term, repeated measures (same individuals) before and after policy changes that legalized or liberalized wolf-killing or conversely, tightened protections for grey wolves. In total, 3 independent studies, from Wisconsin and Montana (Appendix 2), have addressed the issue. In the Wisconsin cases, tolerance for grey wolves declined after wolf-killing began or accelerated (Treves *et al.* 2013; Browne-Nuñez *et al.* 2015; Hogberg *et al.* 2015). In Montana, tolerance did not change pre/post the implementation of a public wolf-hunt but increased slightly from baseline several years later (Appendix 2). Although before-and-after comparisons lack the strength of inference of randomized, controlled trials, the Wisconsin research teams conducted both focus groups (Browne-Nuñez *et al.* 2015) and mail-back questionnaires of the same individuals resampled periodically (Hogberg *et al.* 2015), both methods after policies for wolf-killing had changed.

Policies may fail to affect tolerance if they are perceived by the intended targets as insufficient to reduce risks or costs of the hazards, or there may be a lag between the time the policy is enacted and subsequent changes in tolerance. The Wisconsin studies show a 12-yr lag during which time tolerance for grey wolves declined among Euroamericans in the face of such policies. These factors could explain both the growing intolerance witnessed in Wisconsin and the lack of change witnessed in the 2012 and 2018 studies in Montana. Finally, the definition of 'public' in the hypothesis that wolf-killing improves public tolerance has not been systematically scrutinized. Again, studies in Wisconsin suggest different 'publics', or audiences, will have different tolerances for grey wolves (Naughton-Treves *et al.* 2003; Treves *et al.* 2009; Shelley *et al.* 2011). Indeed, studies that examined the nuances of attitudes among the intolerant reported small minorities (<25%) held extreme views (Montag *et al.* 2003; Treves and Martin 2011), whereas the majorities in both Wisconsin and Montana held intermediate attitudes to grey wolves. Given recent findings that majorities in every state disfavor killing grey wolves after livestock fell prey (Manfredo *et al.* 2020), liberalizing wolf-killing is likely to backfire with these groups that are numerous (e.g., urbanites or mutualists) or legally influential (e.g., Ojibwe). The minority who might be targeted by government seeking to improve tolerance for grey wolves, e.g., non-tribal male residents of grey wolf range with familiarity of

hunting (Hogberg *et al.* 2015) or elk-hunting permit holders in Montana, have so far not shown the desired changes (Appendix 2).

A second way to examine the effect of policy on tolerance is to examine tolerance within a society across regions with different policies. To that end, Kaczensky *et al.* (2004) compared attitudes toward brown bears (*Ursus arctos*) in a region of Slovenia where bears are protected and exhibit high conflicts with livestock to a region where bears are harvested as a game species and exhibit minimal conflict with livestock. They found no difference in attitudes toward bears across regions. Similarly, Bruskotter *et al.* (2018) found no differences in attitudes towards grey wolves across 3 regions of the U.S. with different wolf management policies and histories (Bruskotter *et al.* 2018). However, a follow-up study found lower levels of tolerance in areas with wolves among certain sub-groups (i.e., hunters, ranchers; Carlson *et al.* 2020). Research suggests that tolerance for wolves is strongly affected by social group and cultural group identity (Naughton-Treves *et al.* 2003; Shelley *et al.* 2011; Lute and Gore 2014), both of which are influenced by powerful social norms that change more slowly than policies (Marchini and Macdonald 2012; Kinzig *et al.* 2013). Researchers have proposed a variety of mechanisms that may cause attitudes to change both at the individual and societal level (e.g., Ericsson *et al.* 2007; Karlsson and Sjöström 2007; Heberlein and Ericsson 2008; Bruskotter *et al.* 2017). A full review of these mechanisms is beyond our scope. However, a few findings are worth summarizing: (*i*) at the societal level, the U.S. public at large has become substantially more positive towards wolves over the past half-century (George *et al.* 2016; Slagle *et al.* 2017); and (*ii*) improving tolerance is strongly associated with changing social conditions, e.g., increased urbanization, education, income (Teel and Manfredo 2010; Bruskotter *et al.* 2017; Manfredo *et al.* 2019, 2020, 2021). While these findings raise intriguing hypotheses, experimental studies would be useful to better understand causal mechanisms, e.g., Slagle *et al.* (2013). Collectively, however, existing evidence indicates that tolerance for grey wolves across society in general is largely unaffected by management policies.

Tolerance measured through poaching behaviour

Other studies have assessed the effects of wolf-killing policies on tolerance more directly by examining hazard and incidence rates of poaching (illegal killing of grey or red wolves *Canis rufus*). In 3 populations of wolves, growth rates decreased, independent of the number of wolves killed legally, following liberalization of wolf-killing (Chapron and Treves 2016), withstanding challenges that presented no new data (Pepin *et al.* 2017; Stien 2017) or made errors (Olson *et al.* 2017). Indeed, the latter in particular was rebutted (Chapron and Treves 2017a,b), leaving the case stronger. The latter authors' hypothesis that poaching would increase after wolf-killing was legalized or liberalized was corroborated by 4 independent studies using analyses for Mexican grey wolves (Louchouarn *et al.* 2021), Michigan grey wolves (Louchouarn 2023), Wisconsin grey wolves (Santiago-Ávila *et al.* 2020; Santiago-Ávila and Treves 2022), and North Carolina red wolves (Santiago-Ávila *et al.* 2022). Independently, Oliynyk (2023) showed that human-caused mortality in Minnesota's grey wolves rose long-term and apparently permanently after the state held its first public wolf-hunt. Therefore, an overwhelming body of evidence contradicts the suggestion that liberalizing wolf-killing would lessen poaching or intolerance.

Slower population growth was inferred to reflect a hidden cause of mortality, called "cryptic poaching" (Liberg *et al.* 2012). Failure to account for cryptic poaching – for example, discarding information on missing radio-collared wolves – can obscure the dynamics of poaching and bias population models (Treves *et al.* 2017; Santiago-Ávila *et al.* 2020; Agan *et al.* 2021; Santiago-Ávila and Treves 2022; contra Hill *et al.* 2022). For example, research on radio-collared, grey wolves in Wisconsin, Mexican grey wolves in Arizona and New Mexico, and red wolves in North Carolina, all revealed patterns of human poaching behaviour in relation to policy (Santiago-Ávila *et al.* 2020; Louchouarn *et al.* 2021; Santiago-Ávila *et al.* 2022; Santiago-Ávila and Treves 2022). Moreover, the latest studies follow new Open Science rules for registered reports that reduce publication biases (Sanders *et al.* 2017), following current standards of evidence accepted by the global scientific community.

In summary, research to date has found that the ratio of reported poaching to cryptic poaching, and the sum of all poaching, varies with 1) policy on hunting bears, deer, and coyotes (*Canis latrans*); 2) U.S.

federal policy on grey wolf protection; and 3) the methods used to census grey wolves. The relative increase in poaching rates and the ratio of reported of cryptic poaching appear to vary by wolf population in ways not yet explained by theory. More policy and management variables are likely to surface when more teams investigate anthropogenic influences on the rates of both disappearance of marked carnivores and reported poaching. In short, liberalizing wolf-killing did not raise tolerance when tolerance was measured behaviorally, via poaching rates. Therefore, intention to poach is a behavioural measure of tolerance corroborating the attitudinal measures of tolerance in the previous paragraphs at least for U.S. populations.

Two studies from Nordic countries provided potentially credible research to suggest that grey wolf policy can reduce poaching albeit with unresolved shortcomings. In the first from Scandinavia, the investigators believe legalizing wolf-hunting reduced losses of breeding wolves (Liberg *et al.* 2020). However, that conclusion was questioned on statistical grounds for inappropriate survival analyses, and an unusual and possibly incorrect population-level model (Treves *et al.* 2020). Namely, the models ignored an apparent positive correlation between liberalizing killing and rising rates of illegal killing and disappearance, in favour of a claim about a negative correlation that did not seem to account for collinearity or autocorrelation (Treves *et al.* 2020). Also, Liberg *et al.* (2020) neither accounted for deaths of non-breeding wolves nor addressed the findings from the second Nordic study. In Finland, the number of wolves poached diminished following seasons of higher legal wolf-killing (Suutarinen and Kojola 2017, 2018). Those authors hypothesized that the more legal killing occurred, the lower the risk of poaching because wolves were removed legally before they could be removed illegally (Suutarinen and Kojola 2017, 2018). Moreover, as Santiago-Ávila *et al.* (2020) and Louchouarn *et al.* (2021) pointed out, when the government pre-emptively removes grey wolves suspected of problems before they can be killed illegally, it is difficult to claim humans are exhibiting greater tolerance (Santiago-Ávila *et al.* 2020; Louchouarn *et al.* 2021).

Collectively, virtually all studies of grey wolf-poaching support the hypothesis that governments send a signal to would-be poachers that wolves are low in value, or that the government needs the support of poachers to control wolf populations (Chapron and Treves 2016). Most such policy signals seem to be unintentional but of late state governments have sent explicit signals to would-be poachers. For example, Idaho recently contributed funds to pay bounties for dead wolves (Bruhl 2021), which could inspire poachers in other states to draw on Idaho bounties. Also, in years past, the same agency defied federal regulations protecting wolves by announcing that they would no longer allow their own personnel to investigate reports of grey wolf poaching (Kramer 2010). Such signals encourage law-breaking and disrespect for democratic governance. Thus, we predict the recent state wolf policies have led and will continue to lower tolerance for wolves and increase wolf killing. We find no support for claim 2 and substantial evidence of a counter-productive effect on tolerance.

Claim 3 − Killing wolves will prevent domestic animal losses

One of the long-standing reasons for humans to kill grey wolves and other threatening animals is to protect domestic animals (Treves and Bonacic 2016). For example, the U.S. Department of Agriculture's Wildlife Services division was created largely to kill offending animals (Robinson 2005; USDA APHIS 2015), and local jurisdictions also do so in the U.S. and beyond (Bjorge and Gunson 1983; Fritts *et al.* 1992; Musiani *et al.* 2005; Epstein and Chapron 2018; Darpö 2020). Killing grey wolves or other predators perceived as a threat to domestic animals should be considered against the backdrop of the major causes of livestock death worldwide, i.e., weather, disease, accidents and in some cases, thefts. Hundreds of studies have shown that these factors in combinations that vary by site swamp losses to predators (Murray Berger 2006; Sillero-Zubiri *et al.* 2007).

In the case of determining whether the lethal removal of grey wolves increases livestock protection, the best evidence would come from before-and-after comparisons of interventions with random sampling (Khorozyan 2022) and other safeguards against research bias, such as crossover designs and open science protections against research bias and publication bias (Treves *et al.* 2016, 2019). No such studies exist for wolf-killing. To date, research on protecting livestock from wolves' ranges from before-and-after comparisons without randomization to lower standard, correlational analyses that leave numerous

Image Details

Red Wolf Recovery Program

POPULATION ENHANCEMENT

Red Wolf Recovery Program

States

North Carolina

Red Wolf Recovery Program

Recovery Plan and 5-Year Review now available!

Transcript from September 24, 2024 Virtual Informational Meeting available NOW...click HERE!

Recording available NOW...click HERE!

Canis rufus

Taxon: Mammal

Range: Eastern North Carolina

Status: First listed as “threatened with extinction” under the Endangered Species Preservation Act of 1966 in 1967. Currently listed as an "endangered species" under the Endangered Species Act of 1973.

Population estimate *as of September 2024*:

Known/collared (wild): 16

Total estimate (wild): 17-19

Red Wolf SAFE (captive): 290

Red Wolf Recovery Program Updates - September 2024

Female red wolf 2225 on Alligator River National Wildlife Refuge. | Image Details

Wild Population Update/2024 Releases

On December 1, 2023 the Service published the 2023-2024 release plan. The plan discloses efforts undertaken from October 2023 through June 2024 in support of Red Wolf recovery in eastern North Carolina specific to the pairing and release strategies during that time frame. The following summary includes updates on those efforts and updates on the wild population as of September 2024.

September 2024

Based on extensive monitoring, using multiple monitoring methods, there is no indication that the litter born to 2413F and 2444M survived after the mortality of 2444M on Highway 64 in early June. Pup survival is always a concern after the mortality of one of the breeding pair, particularly red wolves with their first litter, such as was the case with this pair. No carcasses have been found to confirm this.

In mid-June, 2499M was detected as a mortality during tracking and monitoring. Radio collars have a mechanism that changes the signal transmitted when the collar has not moved for a specified period of time, which we hear when they are being actively tracked. The cause of death is unknown at this time, and his mortality is currently under investigation.

The Milltail litter, born to 2225F and 2191M in April, has not been definitively detected and identified during monitoring with remote sensing cameras, tracking and visual observation since late June. Their known activity areas were buffered from management activities during that time.

U.S. Fish & Wildlife Service

Revised Recovery Plan for the Red Wolf (*Canis rufus*)

Third Revision

September 2023

- Multiple Resilient Populations within the Historic Range – multiple populations are likely needed to protect against catastrophic loss (Redundancy).

The only wild Red Wolf population (ENC RWP) experienced significant decline between 2012 and 2020. Since 2020, management actions have stemmed the decline and the population has experienced a slight increase. However, the population is at risk of extirpation due to low resiliency associated with high mortality rates, risks due to demographic stochasticity characteristic of small population size, and low redundancy and representation associated with a single wild population. Additionally, due to space limitations, the SAFE population has been limited in its ability to grow and has largely been used to maintain the already limited genetic diversity in the SAFE population; however, recent investments to increase space is relieving some of this pressure, resulting in growth of the SAFE population. Therefore, the Red Wolf is currently not resilient and cannot become resilient without intervention (Service 2018, pp. 29-30, 70). The distribution of the single wild population is not sufficient to withstand a single large catastrophic event; therefore, the species currently has no redundancy in the wild. Without establishing new wild populations, the species is unlikely to have redundancy in the future. The SAFE population represents the genetic fail-safe for the entire population and much of the future recovery potential for the species. Twelve of the original fourteen genetic lines are still represented in the SAFE population (two of the founders were initially bred, but do not have surviving descendants) (Faust et al. 2016, p.13); therefore, some genetic diversity has been maintained. Into the future, expansion of the captive population should maintain genetic diversity while providing future releases as necessary to support wild populations (Service 2018, pp. 31, 71). There is currently limited representation in the wild. Until natural populations of sufficient size are established and recruiting, maintaining representation in the wild will be difficult. Details on the Service's understanding of the life history needs and species condition can be found in the SSA (Service 2018).

Current Species Threats

We assess "threats" to a species during our determination of whether a species is a threatened or endangered species due to any of the five factors in the Act:

A) the present or threatened destruction, modification, or curtailment of its habitat or range;
B) overutilization for commercial, recreational, scientific, or educational purposes;
C) disease or predation;
D) the inadequacy of existing regulatory mechanisms; and
E) other natural or manmade factors affecting its survival

Below are past, current, and future factors that have, are, or could affect the Red Wolf (both the SAFE and wild populations). Threats are not mutually exclusive as one can trigger another or exacerbate the impacts of another. Factors in bold were identified in the SSA and by the Recovery Team as current primary threats to the species (Service 2018, pp. 31-54; CPSG and Service 2021, pp. 8-15).

- **Small population size and associated inbreeding depression** that decrease species resiliency and exacerbate impacts of other threats (SAFE and wild populations)
- **Anthropogenic-related mortality** (e.g., gunshot, vehicle strikes, management mortality, poisoning, and other suspected illegal activity) (wild population)
- **Coyote hybridization/introgression** (wild population)
- **Negative public perception** of canids that may undermine recovery efforts and could exacerbate some threats above (wild population)
- Future habitat loss from sea level rise and increased flooding (wild population)
- Future habitat loss from development (wild population)
- Disease and parasites (SAFE and wild populations)
- Intraspecific strife (territorial competition between Red Wolves) (SAFE and wild populations)

RECOVERY VISION AND STRATEGY

A recovery vision is a description of the state of the species in terms of resiliency, redundancy, and representation when recovery has been achieved and protections under the Act are no longer needed. The recovery strategy is the recommended path for achieving the recovery vision, and ultimately, delisting the species.

Recovery Vision

In the future, wild and free Red Wolves will coexist with humans in multiple viable populations across the historic range, where ongoing threats are effectively ameliorated through conservation activities, the public's trust and engagement, and aligned policies among all involved with Red Wolf recovery. The recovery of the Red Wolf will provide a strong sense of community ownership, cultural importance, and pride, in line with the values of the communities in which they occur.

Recovery Strategy

The recovery strategy for the Red Wolf focuses on improving resiliency and redundancy and maintaining representation to meet the species' needs for viability. Specifically, the strategy seeks to expand distribution of the species in the wild, increase population abundance, maintain gene diversity long-term, and implement collaborative conservation to address species threats as well as societal values related to Red Wolf recovery. This approach recognizes that recovery requires that the species' needs for viability (multiple resilient populations, genetic diversity, and adequate numbers and habitat) be met and certain biological targets (i.e., criteria) achieved, but that those targets would be difficult to achieve and likely cannot be met without social acceptance of and community support for the strategies and Red Wolf recovery.

Expand distribution of the species

U.S. Fish & Wildlife Service
ECOS

ECOS /

Red wolf (*Canis rufus*)

Range Information | Candidate Info | Federal Register | Recovery | Critical Habitat | SSA | Conservation Plans | Petitions | Biological Opinions | Life History

Taxonomy: View taxonomy in ITIS

Listing Status: Endangered and Experimental Population, Non-Essential

General Information

As their name suggests, red wolves are known for the characteristic reddish color of their fur most apparent behind the ears and along the neck and legs, but are mostly brown and buff colored with some black along their backs. Intermediate in size to gray wolves and coyotes, the average adult red wolf weighs 45-80 pounds, stands about 26 inches at the shoulder and is about 4 feet long from the tip of the nose to the end of the tail.

The species historical range included North Carolina, Tennessee, Texas. See below for information about where the species is known or believed to occur.

Population detail

The following populations are being monitored: Red wolf

Current Listing Status Summary

Show 10 entries

Status	Date Listed	Lead Region	Where Listed
Experimental Population, Non-Essential	11-19-1986	Southeast Region (Region 4)	U.S.A. (portions of NC and species information
Endangered	03-11-1967	Southeast Region	Wherever found, except w

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» Range Information

Current Range

Last Updated: 09-13-2023 *- Wherever found, except where listed as an experimental population*

Last Updated: 12-05-2023 *- U.S.A. (portions of NC and TN see 17.84(c)(9))*

Zoom in! Some species' locations may be small and hard to see from a wide perspective. To narrow-in on locations, check the state and county lists (below) and then use the zoom tool.

Want the FWS's current range for all species? Click here to download a zip file containing all individual shapefiles and metadata for all species.

* For consultation needs do not use only this current range map, please use IPaC.

Current range maps are only shown within the jurisdictional boundaries of the United States of America. The species may also occur outside this region.

- **Wherever found, except where listed as an experimental population**

  Listing status: Endangered

  - **States/US Territories** in which this population is known to or is believed to occur: North Carolina
  - **US Counties** in which this population is known to or is believed to occur: View All
  - **USFWS Refuges** in which this population is known to occur: Alligator River National Wildlife Refuge, Cape Romain National Wildlife Refuge, Mattamuskeet National Wildlife Refuge ...Show All Refuges

- **U.S.A. (portions of NC and TN see 17.84(c)(9))**

  Listing status: Experimental Population, Non-Essential

  - **States/US Territories** in which this population is known to or is believed to occur: North Carolina
  - **US Counties** in which this population is known to or is believed to occur: View All
  - **USFWS Refuges** in which this population is known to occur:

» Candidate Information

No Candidate information available for this species.

No Candidate Assessments available for this species.
No Candidate Notice of Review Documents currently available for this species.
No Uplisting Documents currently available for this species.

» Federal Register Documents

Federal Register Documents

Show 10 entries

Date	Citation Page	Title
05/13/2022	87 FR 29364 29366	Initiation of 5- Year Status Reviews for 35 Southeastern Species; Request for Information
11/15/2021	86 FR 62980 62982	Withdrawal of Rule Proposing Replacement of the Regulations for the Noness Experimental Population of Red Wolves in Northeastern North Carolina
08/13/2018	83 FR 39979 39980	Proposed Replacement of the Regulations for the Nonessential Experimental Population of Red Wolves in Northeastern North Carolina; reopening of comn period
06/28/2018	83 FR 30382 30396	Proposed Replacement of the Regulations for the Nonessential Experimental Population of Red Wolves in Northeastern North Carolina
05/23/2017	82 FR 23518	Endangered and Threatened Wildlife and Plants; Nonessential Experimental P of Red Wolves (Canis rufus) in North Carolina
10/31/2016	81 FR 75425	Endangered and Threatened Wildlife and Plants; 5-Year Status Review of the F
09/20/2005	70 FR 55157 55158	5-Year Review of 14 Southeastern Species
11/05/1999	64 FR 60454	Notice of Three Public Open Houses Prior to Proposing a Revision to the Spec

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» Species Status Assessments (SSAs)

Species Status Assessments (SSAs)

Show 10 entries

Document Date	Document Version	Document Title
[illegible]	[illegible]	[illegible]

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Special Rule Publications

Show 10 entries

Date	Citation Page	Title
04/13/1995	60 FR 18940 18948	Red Wolves in North Carolina and Tennessee; Revision of the Special Rule Populations; Final Rule
11/04/1991	56 FR 56325 56334	ETWP; Determination of Experimental Population Status for an Introduced Carolina and Tennessee; 56 FR 56325 56334

11/19/1986	51 FR 41790 41797	Determination of Experimental Population Status for Introduced Populati 51 FR 41790-41797
07/24/1986	51 FR 26564 26569	Proposed Determination of Experimental Population Status for Introduce

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» Recovery

- Species with Recovery Documents Data Explorer
- Recovery Priority Number: 5C

Current Recovery Plan(s)

Show 10 entries

Date	Plan Stage	Recovery Plan	Implementation Status	SSAs/Biological Reports
09/29/2023	Final Revision 3	Revised Recovery Plan for the Red Wolf (Canis rufus)	View Implementation Progress	• Red wolf species sta assessment - 04/19/
10/26/1990	Final Revision 2	Red Wolf Recovery/Species Survival Plan	View Implementation Progress	• Red wolf species sta assessment - 04/19/

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Other Recovery Documents

Note: This report includes actual Five Year Review completions and notices as well as records that act as Five Year Review completions and notices.

Show 10 entries

Date	Citation Page	Title	Document
09/28/2022		Notice of Draft Revised Recovery Plan for the Red Wolf (Canis rufus), Third Revision	• Docu Recov
05/13/2022	87 FR 29364 29366	Initiation of 5- Year Status Reviews for 35 Southeastern Species; Request for Information	• Five Y Solicit
10/31/2016	81 FR 75425	Endangered and Threatened Wildlife and Plants; 5-Year Status Review of the Red Wolf	• Five Y Solicit
09/20/2005	70 FR 55157 55158	5-Year Review of 14 Southeastern Species	• Five Y Solicit

12/09/1997	62 FR 64799 64800	ETWP; 90-Day Finding for a Petition To Delist the Red Wolf	• Delist Subst

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Five Year Reviews

Note: This report includes actual Five Year Review completions as well as records that act as Five Year Review completions.

Show 10 entries

Date	Title
04/03/2024	Red Wolf (Canis rufus) 5-Year Status Review 2024
04/23/2018	Red Wolf (Canis rufus) 5-Year Review 2018

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No Delisting Documents currently available for this species.

» Critical Habitat

No Critical Habitat Documents currently available for this species.

» Conservation Plans

No Conservation Plans currently available for this species.

» Petitions

Show 10 entries

Petition Title	Date Received by the FWS	Where the species is believed to or known to occur	Petitioner Name	Requested Action	Petition Finding(s)	Ac
Red wolf (Canis rufus); Delisting	09/04/1991	NC	• Mr. James Magagna President	• Delisting: Due to error - Taxonomic revision	• Petition findings not yet made	

Red wolf (Canis rufus); Delist	08/15/1995	NC	• Rob Gordon, Executive Director	• Delisting: Due to error - Taxonomic revision	• Petition findings not yet made
Red Wolf (Canis rufus) Emergency petition to Revise 10(j) rule	05/24/2016	NC	• WOLF CONSERVATION CENTER • WILDLANDS NETWORK • CENTER FOR BIOLOGICAL	• APA: Other	• Petition findings not yet made

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» Biological Opinions

To see all FWS Issued Biological Opinions please visit the BO Report.

No Life History information has been entered into this system for this species.

» Other Resources

NatureServe Explorer Species Reports-- NatureServe Explorer is a source for authoritative conservation information on more than 50,000 plants, animals and ecological communtities of the U.S and Canada. NatureServe Explorer provides in-depth information on rare and endangered species, but includes common plants and animals too. NatureServe Explorer is a product of NatureServe in collaboration with the Natural Heritage Network.

ITIS Reports-- ITIS (the Integrated Taxonomic Information System) is a source for authoritative taxonomic information on plants, animals, fungi, and microbes of North America and the world.

FWS Digital Media Library -- The U.S. Fish and Wildlife Service's National Digital Library is a searchable collection of selected images, historical artifacts, audio clips, publications, and video." +

CERTIFICATE OF SERVICE

I hereby certify that on November 27, 2024, I electronically filed the foregoing **APPENDIX TO STATEMENT OF UNCONTESTED FACTS** with the Clerk of the Court using the CM/ECF system, which will automatically send notification of such filing to counsel for Defendants.

/s/ Collette L. Adkins
Collette L. Adkins